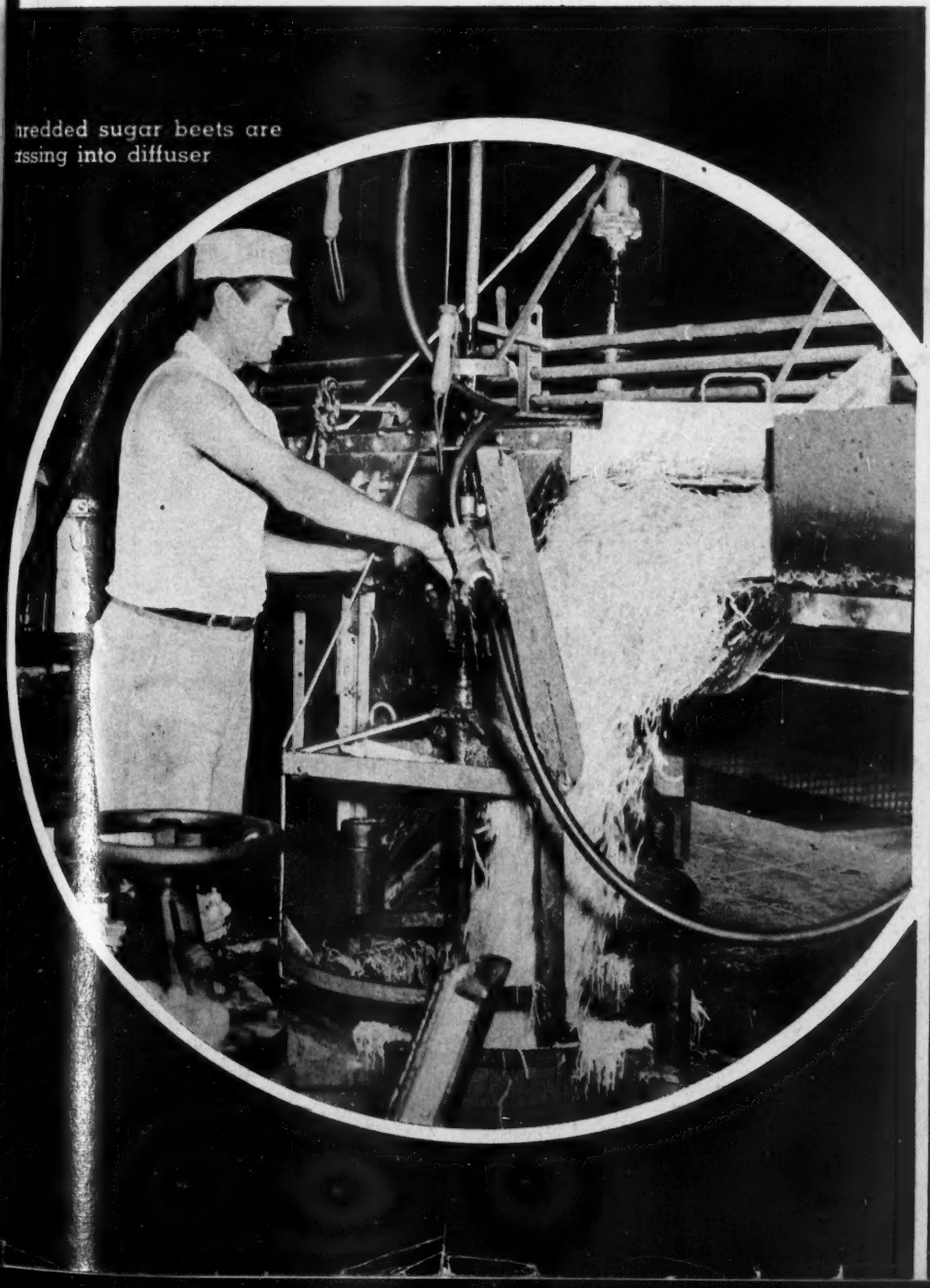
EAST ENGINEERING LIBRARY
MAR 18 1947

FOOD INDUSTRIES

NATIONAL EDITION

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION



...redded sugar beets are ...ssing into diffuser

MARCH 1947

New Products Through Research

Packaging Quick Frozen Oysters

Maturity of Peas Influences Quality

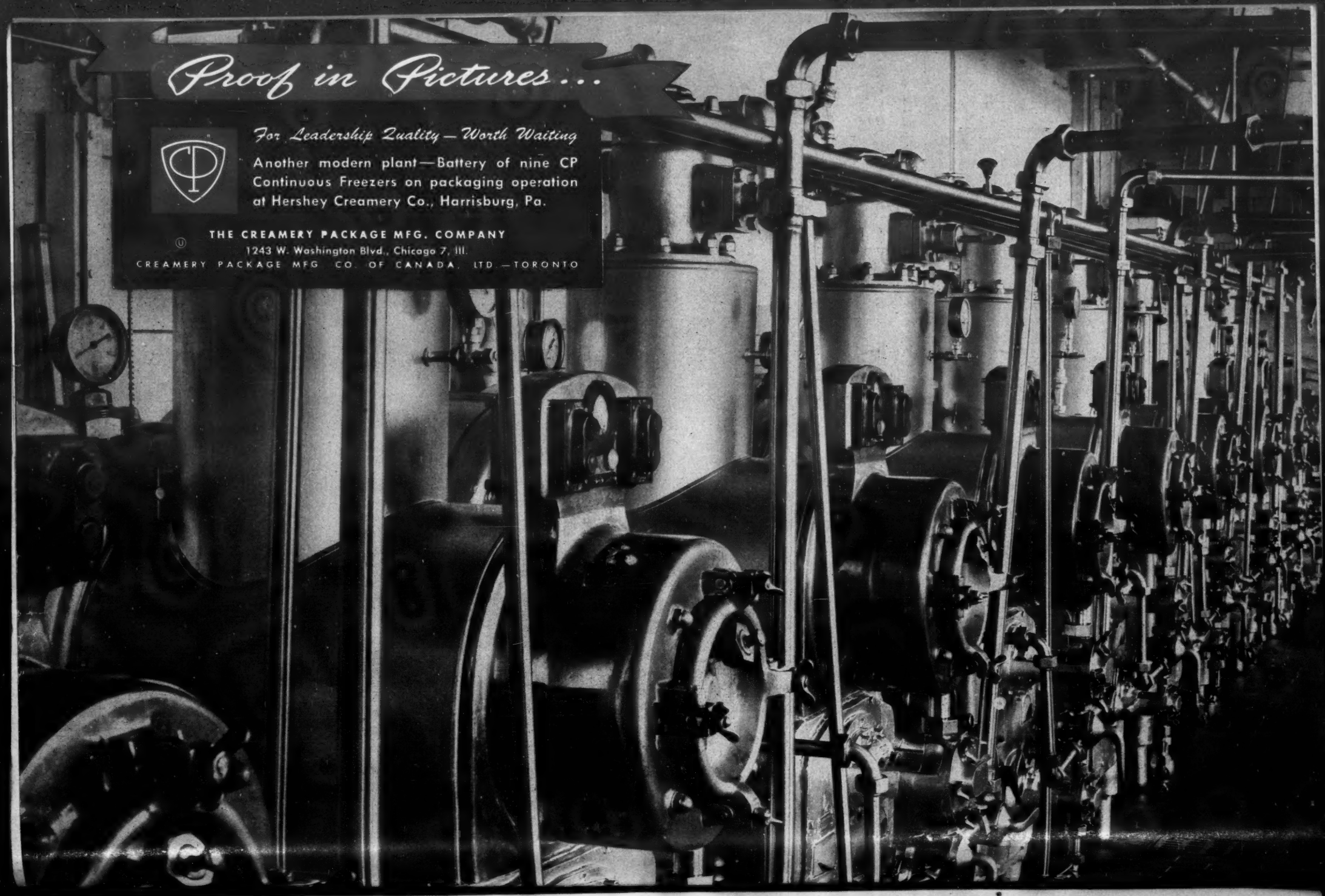
The Control Chart in Taste Testing

Storage of Frozen Cakes and Batters

Potato Chips Travel by Truck

Facts to Consider in Building Plants

McGRAW-HILL PUBLICATION


Proof in Pictures...
For Leadership Quality—Worth Waiting
Another modern plant—Battery of nine CP Continuous Freezers on packaging operation at Hershey Creamery Co., Harrisburg, Pa.
THE CREAMERY PACKAGE MFG. COMPANY
1243 W. Washington Blvd., Chicago 7, Ill.
CREAMERY PACKAGE MFG. CO. OF CANADA, LTD.—TORONTO

Ways To Spend $333 Billion

AT this time of the year most of us are acutely conscious of income taxes. We must cough up enough to pay our debit to Uncle Sam on last year's income tax, and make a down payment on our guess as to how much we must pay more than our 20 percent withholding tax in 1947.

Part of what we are paying for income taxes goes to pay for World War I, still far from liquidated. Part goes to pay for the government's extravagance of the years from 1933-1940. Another part goes to pay the ordinary costs of government. But the largest part must go to pay for World War II.

It will be a shock to most Americans to learn that other peoples in various parts of the earth are of the opinion that American economic policy was the indirect cause of World War II, and that, unless it is markedly changed, it will bring about World War III. It is impossible to debate that frequent assertion in this limited space. All I want to do is point out that wars are very costly and that, when they are won, there is no ending of the expense. We must keep on paying—and for what?

What do we get out of a war? What did we get out of the latest war? You can put it in one word—nothing! Sure, we spent $330,000,000,000 to save ourselves from defeat. We lost 310,000 men who were worth $10,000 each to the national economy. Total: $333,100,000,000.

We Keep on Paying

Not only that, every year we must pay out $5,000,000,000 for debt service, another $5,000,000,000 for care of disabled veterans, and $11,000,000,000 more each year for national security or defense. Although the war is over we must keep spending at better than $20,000,000,000 a year. All the talk about income tax reduction cannot ignore those postwar expenses. The only way we can reduce income taxes is by making the United Nations (or some form of world government) succeed so that we can cut about $5 or $6 billion from our cost for national security.

A reduction in taxes is as good as an increase in income. I bring up the cost of wars because there are signs aplenty that many Americans are seeking to defeat International Trade Organization and Food and Agricultural Organization. ITO and FAO are part and parcel of the United Nations. Either we must forego certain immediate economic values to make UN work, or we must pay forever through the nose, as we are paying at present. So long as we must pay an outrageous price, one way or the other, why not get something more satisfying than military might for our cash?

What Could Have Been Done

Have you any idea what we could have done for ourselves in the USA with $333,100,000,000? Here are a few calculations. Or you can make your own. You will be astonished at the difficulty of spending $333,100,000,000 for peacetime activities. Leave out the fact that it represents two years of national income.

If we paved every mile of unimproved roads, streets and alleys in the country at a cost of $50,000 a mile, it would cost only $82 billion, leaving $251 billion. We could give every car owner a new $1500 car and that would cost $52½ billion more, leaving $198½ billion. Then we could give every ex-GI a $2000 trip overseas to take his family to the scenes of his wartime adventures and we would set ourselves back by only $20 billion. And still there would be $178½ billions left.

The beautiful U.S. Supreme Court Building cost about $8 million when built. We could build a municipal theater, music hall, art gallery and library, patterned after the Supreme Court Building, in every city having more than 25,000 population and it would cost us only $4 billion, leaving $174½ billion still to spend.

Next we could build a $10,000,000 hospital in every place of 5000 or more people, which would cost another $30 billion. There still would be $144½ billion left out of the cost of World War II.

If we chose to retire every person over 60 on a pension of $50 a week, it would cost only $3½ billion a year, and it would take 41 years to use up that $144½ billion.

Peace is Really Cheaper Than War

But why go on? Anyone can do his own figuring and derive his own concept of what could have been done in a constructive way with the cost of the war. If we cannot convince ourselves that the nation should pay the cost of peace we deserve to pay the increasing cost of wars.

In advocating the cause of peace I have not overlooked the realities. We want a peace that is real—not a Treaty of Versailles.

H. V. Burton EDITOR

The Talk of the Industry

• Once again the enraptured advertising writer is with us. Consider General Baking Company's "Homogenized Bread."

• WE see by the papers that some members of the proprietary (patent to you) medicine industry now want to have jurisdiction over their advertising taken from Federal Trade Commission and given to Food and Drug Administration. Seems as if the boys have changed their minds. Time was when they were all hot for F.T.C.

• ON January 2, 1946 a spokesman for grocery manufacturers predicted a drop of a billion dollars in 1946 retail food sales, basing it on an expected 5 percent price decline. As it turned out things went the other way.

• A READER in England calls attention "without comment" to a letter to the Birmingham Mail, 30 November 1946, about "the new plastic—the pale, orange, gelatinous substance . . . shown on the grocer's bill as 'cheese'." Plastic is a new appellation. Heretofore, the sneering have had only the choice of vulcanized, denatured and bouncing.

• THAT 20,000,000-bushel surplus of potatoes, now frozen and virtually worthless, are not a part of the frozen food industry's production.

• One of the more vocal champions of the New Deal in its early days was J. David Stern, recent owner of three newspapers in Camden, N. J. and Philadelphia. But about four months ago he began to complain publicly about the unfairness and the impossible demands of certain CIO unions that had struck his newspapers. Judging by what he said in paid ads in New York newspapers, it would seem that his offers of wage increases were reasonable and should have been accepted by the strikers comprising about half his employees.

The last chapter is now completed in the sorry tale that has turned from enthusiastic support of New Dealism to actions that speak louder than words Mr. Stern can utter. He has sold his three newspapers to the competition and his former publications have suspended!

The strikers who have been out for about three months will lose their jobs, for now there are no jobs to go back to. The shrieks of displeasure from the strikers can be heard for 90 miles.

It's one thing to be out of work, knowing that, by virtue of the Wagner Act, all one needs do is resume work; it's something else to be out of work if there's no job.

• Something unusual in business technics has developed in the past year. A new company enters into a bona fide contract with an old established firm for much of its production, sells a new issue of securities based on the combined arrangement. Next comes a series of events so irritating to the contractee that the contract is voided. Ho Hum. Yes, the SEC permitted the sale.

• Of all the comments about the similarity or dissimilarity between now and 1920 only one person, to our knowledge, has said that our times are exactly like the second year after World War I. Our exceptional man has been rereading the annual reports of previous presidents of the company he now heads, and found this statement in 1920: "The trouble with business today is hand-to-mouth-buying."

• Roger Wilson rushed up to us at a convention, the other day, to tell how much help a reader was getting from FOOD INDUSTRIES. A colored maid in his home was given a copy of the article "So You Want To Be A Foreman?" and urged to make her husband read it. Three days later the maid's husband was promoted from common laborer in a meat packing plant to foreman!

Hors d'Oeuvres

• *A truck carrying 18,000 lb. of horsemeat "fit for human consumption," was recently hijacked, according to a public print. Hope the hijackers don't find out what it's fit for.*

• A cow's self back-scratcher is reported by Business Week that rubs on an insecticide at the same time. The Farm Journal tells of a concrete foot bath on the way to the barn. No one has yet come up with a predigested cud, but give them time.

• *Mr. A. Appleyard, president of the South African Food Canners Council, and Dr. A. J. Kidney, general technical manager of a Belfast, Ireland meat packing company, are names to conjure with in the food business.*

• USDA says you remove the onion odor from a peeling knife by running it through a raw potato. There are those who would prefer to keep it on the knife.

• *The Pickle Packers persistently pursuing proper patter prescribe "Quickle" to replace "Kosher" as the name for the quick packed pickle. Qute, eh!*

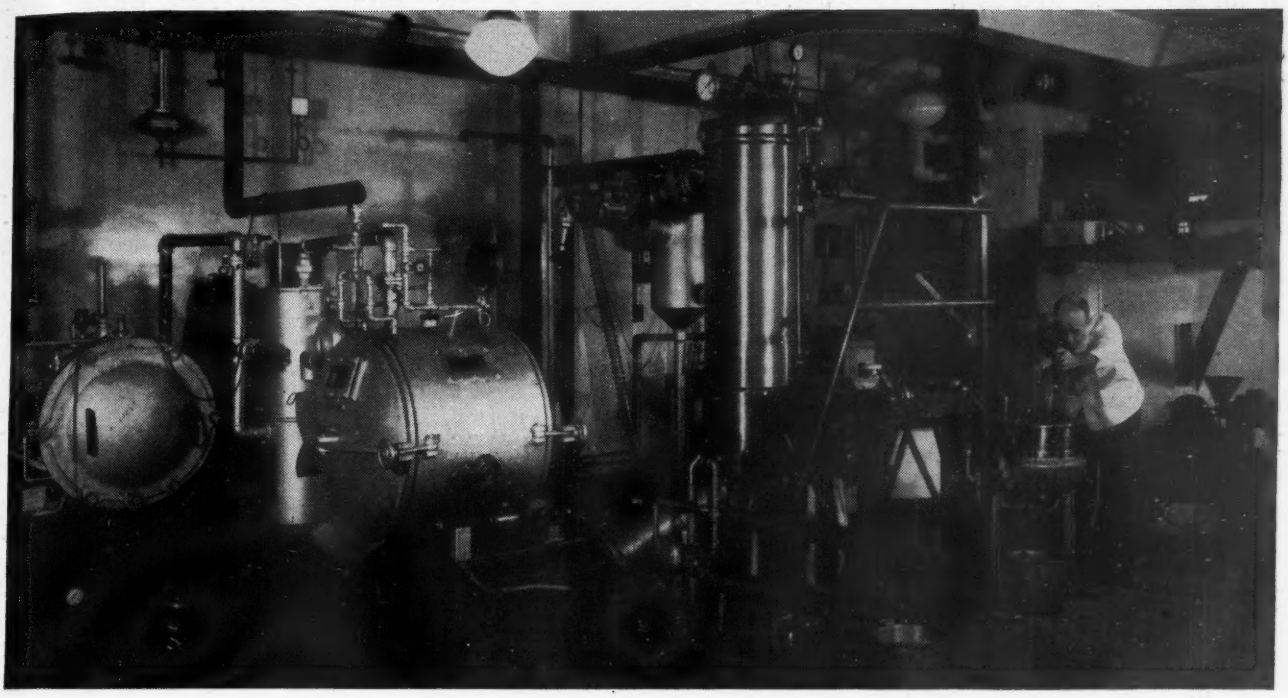
• Just after having artificial fatherhood foisted upon them, bulls now learn that breeders are trying to develop "cows that sweat"—for warm areas. But this is by no means all. Dr. W. E. Peterson, U. of Minnesota, in discussing hormone injections, is reported to have said that theoretically there is no reason why steers and bulls could not be made to give milk. Spain and Mexico will soon be the only places left for a self-respecting bull.

• *Why bother producing food to be eaten. One electrical manufacturing company buys annually 960,000 lb. of corn flour and 115 barrels of molasses for use in foundry cores, 6,000 lb. of wheat flour for polishing operations, 11,300 lb. of sugar for application in sirup form to stiffen steel used in magnetic circuits, 700 lb. of vegetable shortening for mold lubrication. And no F&DA or taste testers.*

• Steilacoom Hartog Sylvia Ondinus was the State of Washington's top milk producer in December. Now you know why Borden's Elsie gets so much more publicity.

• *In an article on taste perception, the QMC starts off by asking, "Can you tell the difference between a glass of distilled water and one heavily saturated with salt." Not being a conclusion jumper, we put it to the test. From now on we jump at all reasonable conclusions.*

J.A.J.J.



Semicommercial processing units are used in the Borden new products laboratory for producing small lots for trial and for working out the problems encountered in manufacturing them. Among the pilot units in the laboratory are small scale spray and vacuum roll driers, vacuum pans, Fort Wayne sterilizer, freezers, colloid mills, grinding and pulverizing equipment.

New Products Through Research

A soluble coffee and a special food for the aged are two of the items developed by Borden's New Products Research Laboratory, which works closely with the production and sales departments on all new products

F. L. SEYMOUR-JONES, Director, New Products Research Laboratory
The Borden Company, New York

MANY leading food companies of today owe not only their present position but also their very foundation to new products research. The Borden Company is an existing example. It did not discover milk, but its first product was a new one. This was condensed milk, discovered and developed by Gail Borden and successfully marketed by him and Jeremiah Milbank, who provided the business know-how, a very essential ingredient of success. Other examples will readily occur to the reader.

But companies cannot continue to exist in a society of free enterprise merely by coasting along on the products with which they started. Any successful product invites competition. Patents expire all too speedily. Competitors take advantage of the originator's tendency to relax, and come out with improvements or with alternative products. Furthermore, competition means lower prices and closer margins, with ever increasing emphasis on more efficient methods of manufacture.

Saturated Market

There is another angle to be borne in mind, one in which the food industry is unique. The manufacturer of radios, of automobiles, of washing machines, can calculate the number in the country and hence to what degree his market is saturated. On the other hand the statistically average American, one hundred and forty million of him and her, puts five pounds of food into his stomach every day in the year. Nutritionists have shown that from the standpoint of calories the average American diet is adequate. So the food industry alone is dealing with a market which is, on the average, approximately saturated.

Population slowly increases, but not at a rate to make too much difference to food supply. As conditions vary from prosperity to depression, so do people eat a little better or a little worse, but statistically the difference is not great. Those less well off will, when and if they prosper, change their diet to a more appetizing and possibly (but not necessarily) more nutritious one. But it is more a change in type of food than in total food. Progress

in the science of nutrition, when the results reach to and are accepted by the public, will cause changes in classes of foods eaten but not so much in the quantity consumed. Other industry stocks will fluctuate widely on the market. Prices of stocks of food companies are relatively stable, as neither bonanza nor catastrophe is to be expected.

Trends in Eating

Hence if a food company is to progress in its strictly limited market, it must watch the public taste in food, keeping ahead of it if possible, but never falling behind. It can only progress by making something better, or more nutritious, or more attractive. There are definite trends in eating. The dairy industry has been fortunate in that people increasingly believe in the nutritive value of dairy products. Whether the industry has made the most of what scientists have discovered of the nutritive value of dairy products is another story. On the other hand the baking industry has very definitely seen a decrease in the per capita consumption of bread.

New products being essential to progress, how does a food company go about getting them? It can, and usually does, follow two lines. It may buy up a small company founded and run by the originator of a product. This is mutually profitable, as the larger concern, with its wider marketing facilities, can greatly increase the sales of the product in question. Secondly, it can do its own research and develop its own new products—new, that is, to its own set-up. Ideally they should be new and unique, but that fortunate circumstance is not always possible.

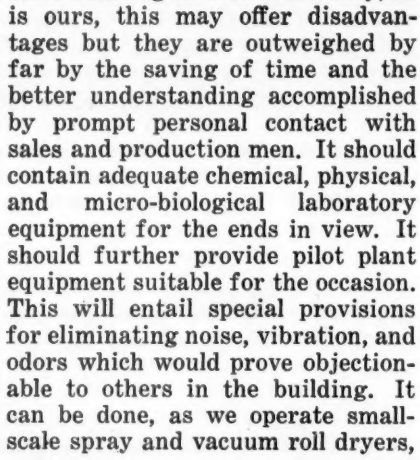
De-Centralized Research

Different companies have different ideas on how this research should be done. Some are so integrated that centralized research is most satisfactory. In others products are so varied in nature that solely centralized research would be absurd. In such cases products usually fall into certain well defined categories, with each division operating under its own executive. The most efficient set-up then is for each division to do its own research for new products, for improvements in existing products, and for trouble shooting. There is, however, always pressure on these research laboratories from the production and sales ends, so that there is also a field for a general, company-wide laboratory to work solely on new product development.

Such a laboratory must necessarily work closely and cooperatively with production and sales departments of all divisions. It is highly desirable that its personnel should have had practical operating and sales experience, so that there should be a down-to-earth attitude which realizes what is sensible and has potentialities and what is harebrained and of no possible commercial importance.

Laboratory Facilities

As it must work closely with all divisions, it is best centrally located. Where the headquarters is in an office building in New York City, as is ours, this may offer disadvantages but they are outweighed by far by the saving of time and the better understanding accomplished by prompt personal contact with sales and production men. It should contain adequate chemical, physical, and micro-biological laboratory equipment for the ends in view. It should further provide pilot plant equipment suitable for the occasion. This will entail special provisions for eliminating noise, vibration, and odors which would prove objectionable to others in the building. It can be done, as we operate small-scale spray and vacuum roll dryers, vacuum pans, Fort Wayne sterilizer, freezers, colloid mills, grinders, pulverizers, and so on, and yet maintain amicable relations with tenants on the floor above us.



A sample coffee roaster was needed for the work on soluble coffee. Good ventilation is important when the new products laboratory is located in an office building, frequently a convenient arrangement.

Personnel

Discussion of the ideal in personnel is too long a topic for this article, but a few high spots may be mentioned. In any research absolute integrity and intellectual honesty come first. Originality and the knack of getting around difficulties are highly desirable. A certain commercial sense, hard to define but easily recognizable, is very advantageous. The ability to get along with one's fellow workers is essential. Lastly, but not necessarily least, comes knowledge of chemistry, micro-biology, engineering, nutrition—in other words, of food technology.

Sources of Ideas

Having set up your laboratory and settled on your staff, what are you going to work on? Ideas are not hard to come by but good ideas are a rare commodity. Their evaluation is an exacting task. The most prolific source of ideas should be—and usually is—the various sales departments. The ideas come from sales managers, market research men, and salesmen in general, your closest contact with the buyers and consumers. But these ideas are apt to be of widely variable merit. Some obviously haven't been thought through and others are unsuitable for a variety of reasons. Occasionally one rings the bell.

You may ask for ideas from the organization in general, a sort of suggestion box. This is not likely to be profitable. I can cite one—which so far I have not been able to perfect—which came in from a plant manager. This was for a tablet, to be dropped into a glass of ice water, whereupon it would dissolve and you would have a nice glass of foaming beer. To date the breweries may rest undisturbed.

Suggestions From Friends

Some ideas come in from outside. Those from friends, more particularly those of scientific training, may have merit. Those from the well-wishing consumers are usually not very profitable. As an example, we—and doubtless all other soluble coffee manufacturers—have received many suggestions to market the dried soluble coffee premixed with sugar and dried cream. We experimented with such mixtures

almost as soon as our laboratory development work began. There are very obvious objections. People may or may not take sugar or cream, and they vary greatly in the amount they do take. Dried cream presents a definite problem of keeping quality. Also, when you add boiling water to a mixture of dried coffee and cream you get a beautiful curdling effect; technically, the cream feathers.

Ideas come in from commercial customers and these are more likely to have something to them. Here is an example which came from a baker. Bakers use a lot of sugar and sugar is scarce. When sugar and yeast are used in a mix, the yeast consumes some of the sugar and the final product is, by that much, less sweet. Now if a lactose fermenting yeast were used, it would live on the lactose in the milk solids used and leave the sucrose alone. Lactose doesn't noticeably contribute to the sweetness of baked goods, so that there would be a definite saving of sucrose. Large scale yeast production is a rather specialized operation. One or two of the larger yeast companies reacted violently to the suggestion that they should undertake the production of a lactose-fermenting yeast, as they dreaded the possibility of contamination of their carefully guarded pure strains. This idea at least might justify research into its practicality and into the market possibilities for such a yeast, which should exist so long as there is a sugar shortage.

Other Sources

Then, of course, it is up to the laboratory staff to have, or to get, ideas. I can only recommend a very lively curiosity combined with wide reading and the willingness to listen. Reading, whether it be patents, food magazines, or the women's page of the daily papers, will bring forth ideas worth looking into at least. The Regional Laboratories of the USDA, the State Agricultural Experiment Stations, colleges and universities, all are working on ideas which occasionally strike a harmonious chord. Talking to people, more especially listening, helps. Which is one good reason to be willing to spend time with salesmen. Listen a lot, ask questions, and you will occasionally learn something or get a notion.

How can one tell whether the ideas are worth while? The first criterion is that there must be the possibility of a large volume of sales. That means the product must have wide consumer acceptance. The dairy industry works on one of the lowest profit margins of any industry, so we want to keep away from the bulk commodity field and try to get into products where the margin of profit is attractive. Obviously there is more margin on cereal breakfast foods than on bulk flour.

A Borden product which breaks into a new field is "Gerilac," a special dietary supplement for the aged, an increasingly large market for special food products.

One vital consideration is the cost and the possibility of marketing at a profit. Even in the preliminary stages some sort of an estimate must be made, as intelligently as possible, of what it will cost to make. This means cost of ingredients, containers, of manufacture, packing and overhead. Only thus can the sales department decide whether it would be worth their while to market it.

Marketing Problem

Another factor is where and how the product would be marketed. Our company has a wide variety of sales outlets, from the route wagon delivering bottled milk to the "detail man" calling on physicians. Anything new should fit in somewhere along the line. There is also a word of caution here. You can't wish too many new products on to one sales division all at once. The process of developing a market for a product takes time, people's time, and money, and any one sales division must concentrate on one or two products for best results.

Still another factor is whether existing manufacturing operations are now—or can readily be—equipped to produce the new product. If the projected product is one very alien to and far away from the present line, it is not necessarily rejected but it will call for rather more intense study. The fact that the Borden Company was not geared to roast coffee in this country did not prevent us from entering the soluble coffee field. As a matter of fact, some years ago we used to roast coffee here and, until World War II, still did in Canada, for sweetened condensed coffee.

Soluble Coffee

Soluble coffee can be taken as an example of why an idea is accepted and how it is worked out. Soluble dried coffees have been on the market for very many years, and recently the public seemed to take to them quite enthusiastically. There was also the demand for such a product, raised by the needs of the army overseas where the saving in shipping space was vital. Obviously here was a potentially profitable field, provided a good soluble coffee could be developed. It is a natural accompaniment to cream, so not illogical for a dairy company.

We had a lot to learn about coffee. The work naturally started on a laboratory scale and we had to work out such problems as what types of coffee could be used (in the early stages coffee was scarce and rationed), how and to what degree it should be roasted, the grinding, the best method of extraction, the best method of drying, down to testing the containers to be used. We had to choose between the pure coffee and the so-called "Café" type, with added carbohydrates. We had to study metals and their effect on flavor; the keeping qualities of the dried soluble coffee; how to extract and retain the maximum of caffein. Remember coffee is drunk, not as a nutritious food, but for its flavor and its stimulating qualities, and these latter reside in the caffein. There are a lot of other details omitted here but naturally maximum yields consistent with good flavor are important.

Preliminary work in the laboratory—and this includes work with small scale, pilot plant equipment—must be translated into practice in the plant. Always some difficulties crop up and these must be overcome, sometimes by additional work at the pilot plant stage. There must, of necessity, be close cooperation between research and manufacturing departments until actual production is running smoothly.

A rather different type of product which hit the market recently is the specialty food for the use of the aged. It illustrates where ideas

(*Turn to page* 214)

Facts To Consider In Building That New Plant

Multi-story plants permit gravity flow, but are more expensive to build and less efficient to operate than single story ones. Site location is important. Construction costs are high, but indicated decrease is small

By E. WARREN BOWDEN, Vice-president
Walter Kidde Constructors, Inc., New York, N. Y.

LIKE other manufacturers, the food processor has often relied for expansion on increasing the size of the production area, or working a greater number of shifts. Area expansion has usually been accomplished by simply adding new buildings or warehouses to the existing structure, without regard to the net effect on efficiency of materials flow, department location or production operations.

With a gradual change from a seller's to a buyer's market, it is wise to take stock of the overall plant operation. Are goods produced at top efficiency? Have new processing methods antiquated production facilities? Is it advisable to build a new plant in spite of the present high cost of construction?

It is not possible to answer these questions for any specific case until all the facts are known. But in general, there are some very definite trends in the food industry as far as construction is concerned.

Almost any plant that is more than 20 years old will have one or more operations that can be improved. A qualified industrial engineer, specializing in food processing, can point out inefficiencies after making a thorough study and analysis. Perhaps improvements can be made without disturbing the structure of the building. But in most cases the operation will call for a new and completely different building.

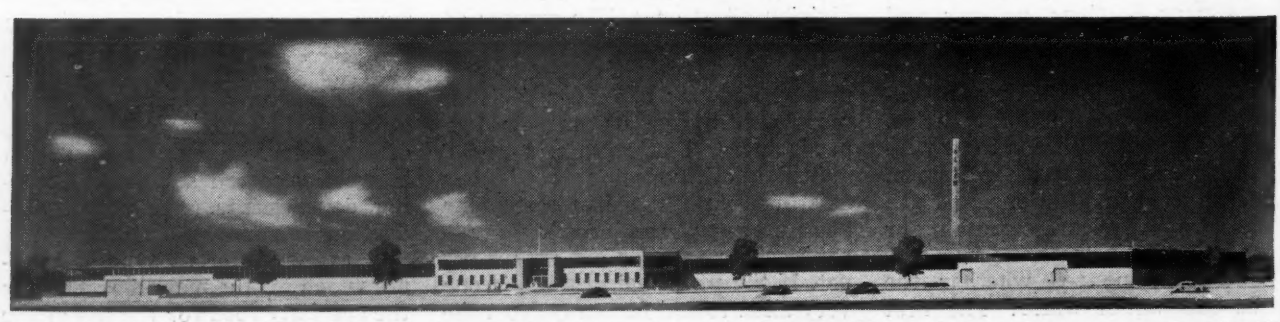
One-Story Layouts

The trend of industrial building design in the past few years has been towards a one-story horizontal layout, supplemented by mechanical handling methods such as conveyor, suction or blowing systems. This type of building has not yet reached the food industry, where the "gravity flow process system" from the top floor to grade has been the main solution to date.

The horizontal plant eliminates the uneconomical layouts used in multi-story buildings, that result in inefficient materials handling and processing. Vertical layouts often break up the process operations to fit the available area on each floor, thus requiring greater personnel for supervision and operation. In one story plants, heavy machine loads and vibration problems may be transferred into the ground instead of into costly structural framework. Safety hazards are reduced. Freight or passenger elevators and duplicate employee facilities may be eliminated or consolidated. Capital investments may increase as much as 30 percent on a multi-story structure, and result in a corresponding loss of productive floor area required by stair towers, aisles and control equipment.

One-story plant layouts eliminate many of the maintenance and repair problems encountered in multi-story structures. One of the greatest of these is the maintenance and repair of concrete floors damaged by trucking loads, especially when modern fork lift trucking methods are used.

In the past, plant designers have followed the practice of fitting the process to the building design, and as a result no real effort has been made to make the building fit the process. Good plant building design should always enclose an efficient equipment layout. In this manner a satisfactory solution to many of the problems facing the production



The trend of industrial building design in the past few years has been towards a one story horizontal layout, supplemented by mechanical handling methods such as conveyors, fork lift trucks for palletized loads, suction and blower systems.

superintendent and plant engineer may be found. In the horizontal one-story layouts, most of the disadvantages of the multi-story plant are eliminated, thus permitting a saving of labor, maintenance and capital investment, which is reflected in the lower costs of finished products.

Process layouts should follow the accepted straight line or rotary methods, with the various departments arranged to permit the most service to each other. Raw materials and finished products should be received and shipped at the locations in the plant where they will eliminate excessive handling and possible damage.

An analysis should be made of the storage requirements for raw materials, materials in process, packaging materials and finished products. This study should be supplemented by process layouts, which will involve the movement of materials to and from the equipment, to established traffic aisles. When these areas have been determined, final consideration should be given to future expansion in those departments which would be affected. The total areas of this space study will determine the ultimate plant layout.

When To Build

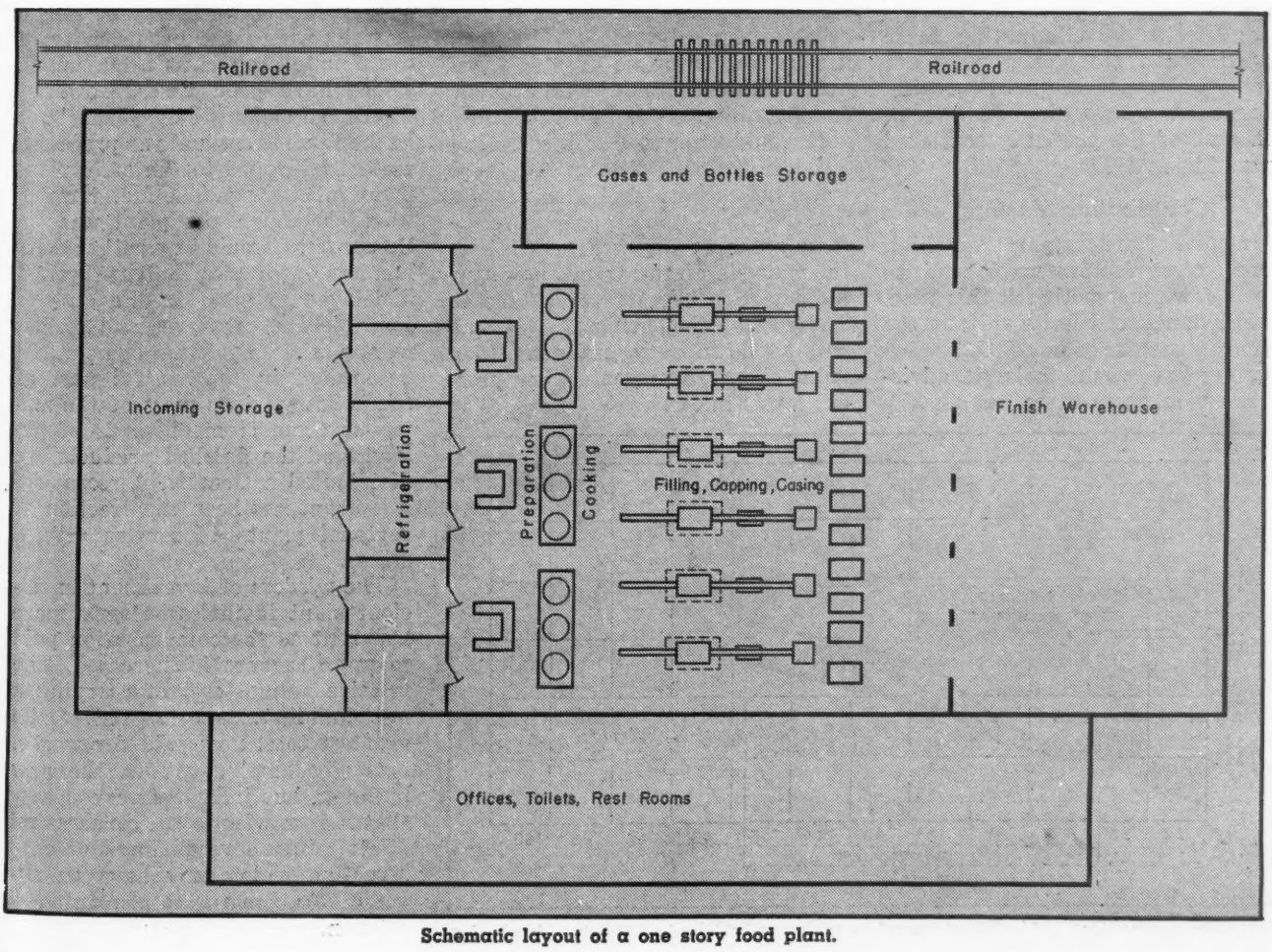
A processor must have excellent reasons and justifiable proof before he builds under present cost conditions. Not only must the new plant produce more efficiently, but the owner should be able to pay for it out of savings effected, based on the profitable process life of the operation.

This may seem like a strong statement, but when it is realized how small an amount, relatively, is represented by the annual charge for the plant building as compared with the annual cost of wages, it bec mes apparent that any reasonable expenditure that will improve labor efficiency will be justified.

Efficiency in production is governed by a large number of factors, and admittedly the most important single factor in increased efficiency is the introduction of modern mechanical equipment, installed in a properly designed building structure. As is often the case such equipment can be precluded by the complete inadequacy of space arrangements. An adequate building and efficient equipment go hand in hand.

In many plants, the limitations imposed by an obsolete building design necessitate the moving of materials in process without the benefit of efficient mechanical conveyors, and over routes which in a properly laid out plant could be reduced to a fraction of the present travel. If the existing multiple-story plant with limited areas, closely spaced columns and numerous bottle necks, were replaced by a properly designed modern plant, a markedly increased efficiency would result. Employee attitude is also an important factor, and it is commonly recognized that improper lighting, poor ventilation and the absence of adequate facilities have a retarding effect on the total output of the finished product.

There is no average plant condition that is representative for the food industry, and the relationship between wages paid and the cost of the investment in different plants varies widely. However, from experience in what might be called the average type of plant now being designed and built, it appears reasonable that the annual charge for



Schematic layout of a one story food plant.

interest, amortization and real estate taxes on the plant itself, without manufacturing equipment, amounts to only about one-tenth or less of the sum paid annually for wages. Take as an example, a plant in which the investment was $400,000. On a 20 year basis, the annual cost for interest and amortization is about $30,000. Taxes amount to an additional $10,000, making a total of $40,000.

This plant formerly had an annual payroll of about $500,000. By building a new plant, the owner was able to reduce his labor requirements by much more than the eight percent of his payroll required to carry the entire cost of the new plant. At the same time the amount formerly paid for the lease of antiquated facilities was entirely eliminated.

There are numberless such instances, where studies will demonstrate that the proposed new plant will pay its complete annual cost in terms of wages saved. At times, savings in handling alone will pay for the new plant. One instance is that of a company now renting several loft areas in a metropolitan district, where it is necessary to move semifinished items from one location to another by truck. The savings effected by eliminating these trucking charges alone, will more than pay the annual carrying charge on a new plant that combines all of the presently scattered operations.

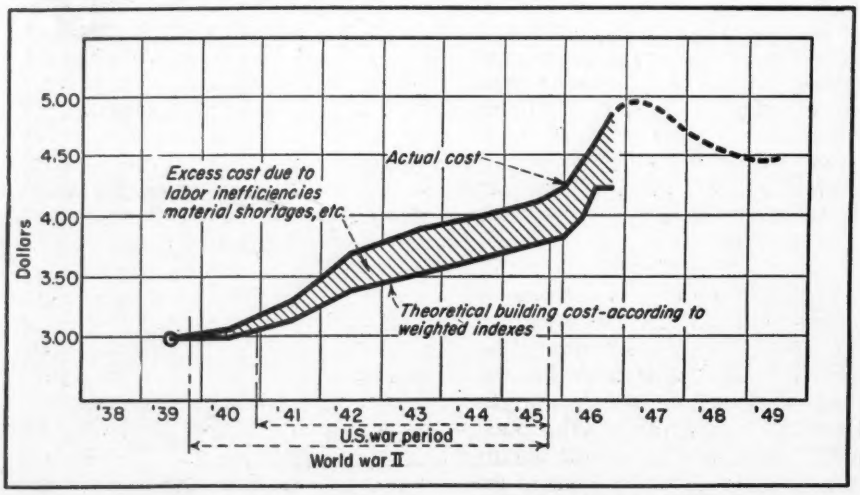
Contributing Factors

In spite of the comparatively high costs other factors may tend to favor new construction at this time. For instance, a definite shift in the geographical location of food-growing centers would make it advisable or, in some cases, mandatory for a manufacturer to move his operation close to his source of supply. A change in marketing conditions, consumer habits or even the labor market could similarly call for a new plant in a new location, notwithstanding modern food carrier developments.

Another money saving benefit may result from the elimination of warehousing bottle necks. Modern warehouse facilities are planned, not only with regard to smooth handling of raw materials and finished products, but also with consideration for possible future expansion.

Most multi-story plant layouts are limited as to the number of pounds per square foot of storage, dependent upon the structural framework design. This allowable load also limits the trucking loads. In the case of a one-story plant, storage and trucking loads on grade for the most part are unlimited. Present plant layouts generally use the floor area economically, but very seldom is the cubage of the building utilized where the storage of materials is required. A careful study should be made with respect to the storage of raw materials and finished products, as well as materials in process. The use of pallets or skids, stored vertically by fork lift trucks, permits a greater space utilization with a minimum of labor and handling.

It would be unwise to recommend a construction program if there were indications that the cost of construction would drop precipitously during the next year. Careful analysis of the trend, however, indicates that costs will start to drop during the spring of 1947, and will go down very gradually to a point about 15 percent below present levels in 1949.



Cost per square foot to build a typical manufacturing plant. Walter Kiddo index.

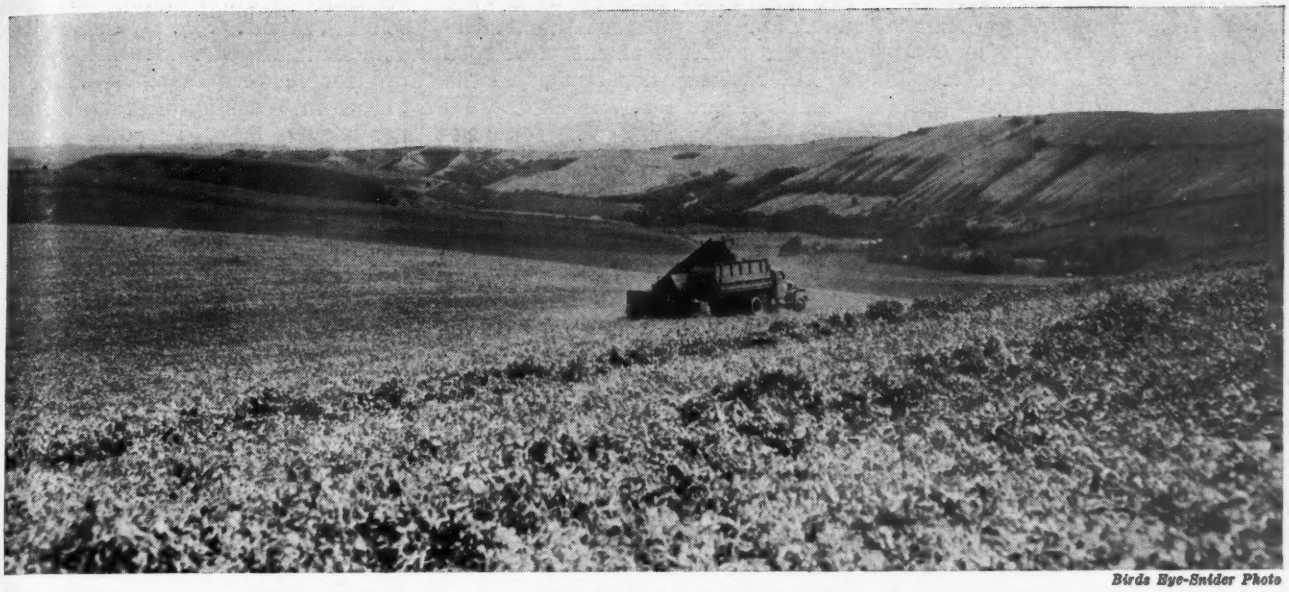
If this gradual decline takes place, there should be no hesitancy to start building at any time, for the savings effected by waiting two or more years may be more than offset by continuing an inefficient operation or low production rates.

Cost of Land

Mention should be made of the cost of land in connection with a new building program. The many problems involved in choosing a plant site cannot be covered in this article, but a warning is in place: no processor should choose a plant site without careful consideration of every civic, economic and transportational factor with respect to employees, markets and materials. Frequently, a more expensive piece of land will save money in the end.

The plant location is dependent upon many factors, the most important of these being type and variety of products; raw material markets; finished product sales distribution; civic, economic, personnel and geographic location. Site locations, therefore, could be at the raw material source, or centrally located with respect to the entire plant's operation. In the case of tomato juice and allied products, it is quite evident that the plant should be built where the productivity of the tomato crop is at a maximum. There have been cases, however, where pulp plants have been built in the farm areas and the processed material shipped to the main plant many miles away. The factor which would establish the plant site, in this process, would be whether there is a loss of vitamin content through a delayed process. In the case of jams, jellies, preserves and pickles on the other hand, the plant might be located in the central part of the country, since most of the materials come from all parts of the land, and the finished products are distributed nationally. A recent development has been the erection of regional plants to service several states.

The wisdom of investment in efficient plant facilities becomes more apparent as the compensation paid to wage earners is increased. The relative annual cost of carrying a new building, as compared to the greatest total now paid for wages, not only amply justifies the new building, but indicates very clearly that it is unwise to cut corners and effect minor savings in plant construction which may have an adverse effect on the total plant production.



Birds Eye-Snider Photo

Modern, mechanized methods are used to harvest and transport peas to the plant.

Degree of Maturity Influences The Quality of Frozen Peas

PART I—Sugar and fat determinations do not appear suitable as indexes of maturity. Protein and skin texture offer possibilities. Starch content shows promise of usefulness as an objective measure of maturity and texture

By J. P. NIELSEN, HORACE CAMPBELL, C. S. BOHART and M. P. MASURE
Western Regional Laboratory,* Albany, Calif.

OF the vegetables preserved by freezing, peas top the list in production. Production of frozen peas has increased from slightly more than 25,000,000 lb. in 1937 to over 103,000,000 lb. in 1945.[1] It is anticipated that expansion in the postwar era will depend to some extent upon the ability of the industry to maintain high and uniform standards for quality.

Among the numerous factors that affect the quality of frozen peas, maturity requires careful consideration because of its relation to color, flavor, and texture. This report deals with some of the results obtained in this laboratory, during the course of studies, designed to aid the industry in establishing precise and accurate methods for quality control. Particular attention has been given to the relation between maturity of raw product and composition and quality of frozen product.

Procedures

The raw material used was obtained through the cooperation of the Utah and Washington State Agricultural Experiment Stations. Peas were grown at Farmington, Utah and Prosser, Wash. Large plots were used to permit shelling in a commercial viner. Peas of each variety studied were harvested at increasing stages of maturity, covering the usual range in commercial practice. Immediately after the peas were shelled, they were washed and graded into a maximum of seven different sieve sizes. The peas were blanched for 90 seconds in boiling water, cooled for three minutes in running water, and frozen on trays in moving air at −10 deg. F. Frozen peas were then packaged in cellophane bags, heat-sealed, and packed in waxed paper cartons. Packages were stored at −10 deg. F. When sufficient material had been accumulated, it was packed with dry ice and shipped to this laboratory, where it was held for five months at −10 deg. F. prior to analysis.

* Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

Determinations of the starch content of frozen samples were made by the method developed by Nielsen[2] and Nielsen and Gleason.[3] Sugar determinations (total sugar) were made by a modification of the Hassid method.[4] Crude protein was calculated by means of the factor 6.25 from data on nitrogen content estimated by the Kjeldahl-Gunning-Arnold method.[5] Total lipids (fats) were determined by the Nielsen and Bohart method.[6] Total solids were determined by drying over-night in an air oven at 158 deg. F., followed by drying overnight under vacuum (28 to 29 in. of mercury) at 158 deg. F. Specific gravity was measured by the method described by Lee.[7,8] In addition, the percentages of peas, with skins removed, that sank in 13, 15 and 16 percent salt solutions were determined. The flavor of the peas and the texture of cotyledons and skins were evaluated by 12 experienced judges after the peas were cooled in a uniform manner.

In studying the characteristics of frozen peas as related to maturity of raw material, an index of maturity must be used as a base line. For this purpose the tenderometer, an instrument developed by the research department of the American Can Co., was used. This instrument measures the force required to press a given quantity of peas through a standard grid. It is used extensively in the canning and freezing industries for estimations of maturity of raw peas. In our studies, tenderometer values were obtained on the freshly harvested field-run material, and on each of the sieve sizes before blanching.

The work reported here deals primarily with four freezing varieties grown in Utah (Thomas Laxton, Wando, Tall Alderman, and Strategem), and with five freezing varieties grown in Washington (Thomas Laxton, Tall Alderman, Teton, Glacier, and Wando).

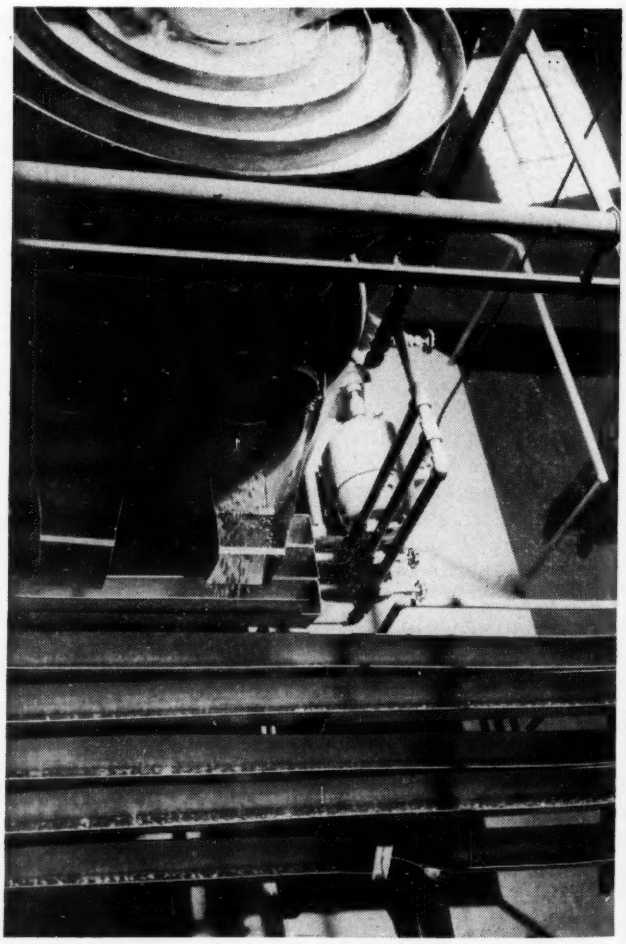
Tenderometer Values

Martin,[9] Martin, Lueck, and Sallee,[10] and Walls and Kemp[11] have reported a high degree of correlation between the maturity of peas and their tenderometer values. In their studies, the criterion of maturity generally used was alcohol-insoluble solids content. Fig. I shows the manner in which tenderometer values for field-run samples of peas grown in Washington varied with the harvest date. The date shown with each variety name was the day chosen for the first harvest. Harvest interval refers to days after this date. The slopes of the curves are practically the same, and the rate of change in tenderometer value per day becomes greater as the peas become older.

Starch Content

Various investigators have noted that as peas increase in maturity, as estimated by increase in size or by increase in interval between blossoming and harvest, they increase in solids and starch contents. This relationship has been suggested as a basis for an index of maturity. Starch content as a standard for maturity, however, has not been used because starch-maturity studies of this nature have not been made, and because the available methods for its determination have been too time-con-

Peas, as soon as they are harvested, move through a dry cleaning mill, to a conveyor carrying them to first washing operation.



An efficient quality separator. Over-mature peas are automatically shunted to one side, leaving only the tender peas.

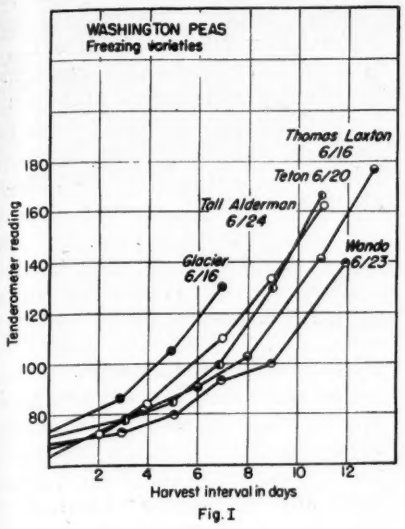


Fig. I

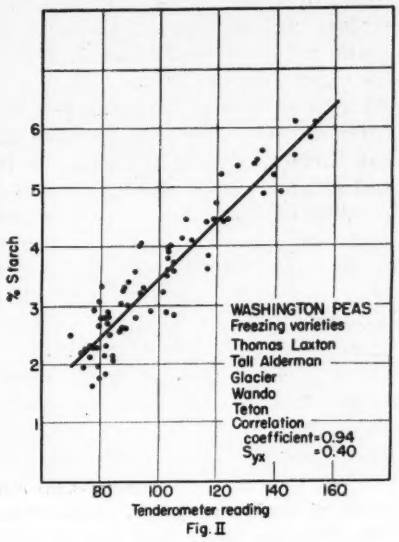


Fig. II

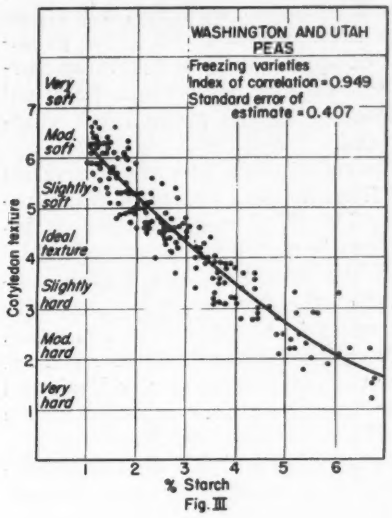


Fig. III

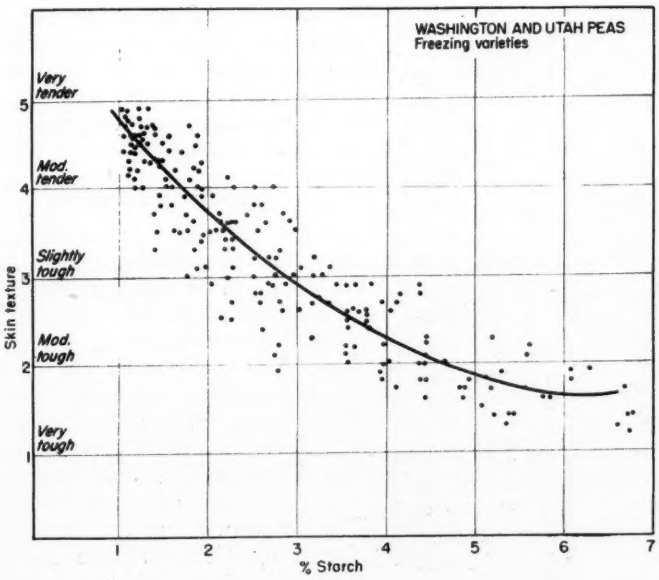


Fig. IV

Fig. I. Relation of harvest dates to tenderometer readings for Washington grown peas. The date below each variety name was the date of the first harvest.

Fig. II. Relation of starch content to tenderometer readings for five varieties of Washington peas.

Fig. III. Starch content of frozen peas as related to texture of cotyledon.

Fig. IV. Relation of starch content of frozen peas to texture of the skins.

Fig. V. Relation of sugar content to maturity, as indicated by tenderometer readings.

Fig. VI. Relation of protein content to maturity, as indicated by tenderometer readings.

Fig. VII. Relation of total lipid content of frozen Washington peas to maturity (by tenderometer).

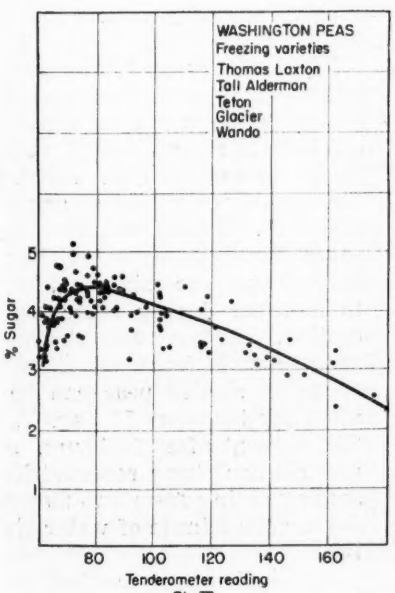


Fig. V

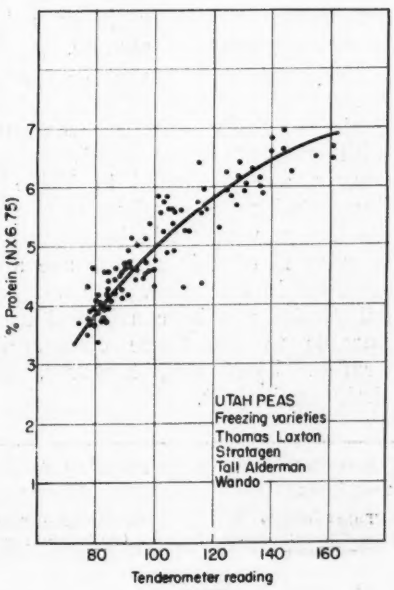


Fig. VI

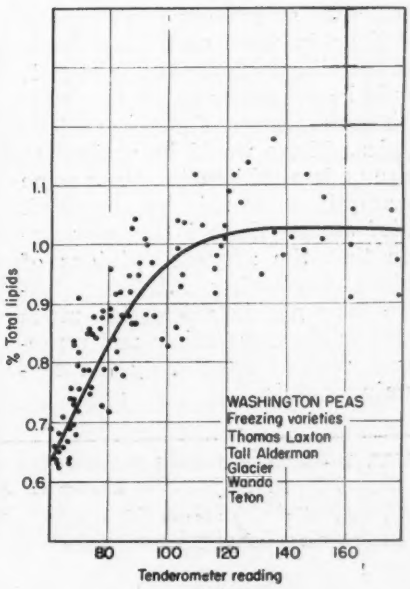


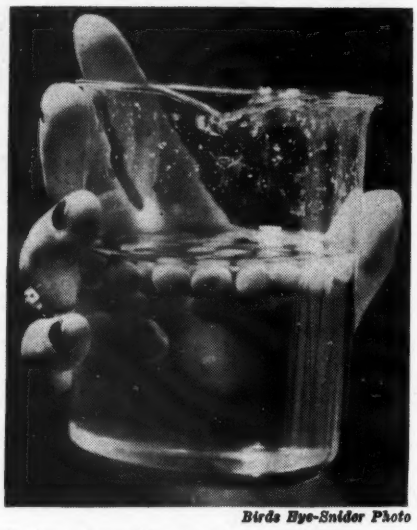
Fig. VII

suming. The starch method used in this study, however, simplifies the determination and gives promise of applicability for grading purposes as soon as certain practical obstacles in the method are eliminated.

Based on data from five varieties of freezing peas grown in Washington, Fig. II shows that as peas increase in maturity, as estimated by the tenderometer, the starch content of the frozen product tends to increase in a straight-line manner. A similar relationship was observed for the varieties grown in Utah and for several canning varieties grown in the two areas. Statistical analysis has revealed a highly significant degree of correlation between maturity, as estimated by the tenderometer, and starch content of the frozen product. Calculations for the freezing varieties from Washington and Utah showed that 88 and 85 percent, respectively, of the observed variance in starch content can be attributed to variation in maturity.

This close relationship suggests that starch content of the frozen product can be used as an index of maturity of raw stock. The relationship between starch content of the frozen product and average scores for estimated texture of cotyledon is shown in Fig. III, which includes the data for the freezing varieties from Washington and Utah. The scores decrease in a curvilinear manner with increase in starch content. Calculations showed that approximately 90 percent of the variance in score of cotyledon texture can be accounted for by difference in maturity, as determined by starch content.

If the starch-cotyledon-texture relationship were used as a basis for grading of frozen peas, it would be necessary to set up limits in starch content for the various grades. These would be arrived at more or less arbitrarily, since some assumptions would be involved. Chief among these is the assumption that the average opinions of judges concerning cotyledon texture does not introduce too much error in the correlation, and represents average opinion by the consuming public.



Birds Eye-Snider Photo

Action of quality separator. Over-mature peas sink and tender peas float in brine.

In this study, samples that had an average score for cotyledon texture of below three (slightly hard) were no longer regarded as fancy. As may be seen from the curve in Fig. III, this score was equivalent to a starch content of 4.6 percent (total solids 21.2 percent). The chances are thus even that a given sample with this value will be either fancy or below fancy in cotyledon texture. For practical purposes, such chances allow no safety margin in estimating actual quality. There would be sufficient margin if a starch content of 3.7 percent (total solids 18.8 percent) was selected as the limit. This value would also reduce the chances of undesirable skin texture in the fancy grade. It should be made clear that the selection of these values and the allowance for some safety margin in the estimation of quality, is an arbitrary one, open to change.

The suggested ranges in starch content of potential use in establishing quality grades, together with corresponding tenderometer ranges, are presented in Table I. Suggested corresponding total solids limits, which will be discussed in part II of this report, are also included in the table. The numerical grades can be considered comparable to the three commercial grades. They are, however, not their equivalent.

TABLE I—Starch and Total Solids Limits of Potential Value in Establishing Quality Grades for Frozen Peas.*

Grade	Starch range, percent	Total solids range, percent	Corresponding tenderometer range
1	Up to 3.70	Up to 18.80	Up to 103
2	3.71 to 4.80	18.81 to 21.20	103 to 128
3	4.81 to 6.40	21.21 to 24.40	128 to 160

* See Charts III and IX and discussion of same.

Since the starch (and the total solids) limits suggested have been arrived at somewhat arbitrarily, it is possible or likely that experience in industry will present other limits than those proposed. It is hoped that the data presented here will stimulate further investigation along this line.

Toughness of Skins

Objection is frequently raised against toughness of skins of frozen peas. Fig. IV indicates that there is a tendency for average organoleptic score for skin texture to decrease with increase in maturity, as estimated by starch content of the frozen material. Boggs, Campbell, and Schwartze[12] have shown that skins of sieve-size 5 of the Tall Alderman and Thomas Laxton varieties increase in toughness, as measured with a penetrometer, with increases in the interval between planting and harvest, and with increasing maturity, as indicated by density.

Sugar and Protein

Sugar content of frozen peas is regarded as important because of its influence on taste. Boswell[13] has shown that as peas increase in age, they decrease in total sugar content. Kertesz[14] found an increase in total sugar with an increase in maturity up to a point, followed by a decrease with further maturity. Data in Fig. V for five freezing varieties of peas grown in Washington, show the same trend found by Kertesz. The fact that Boswell's data did not show the same change is probably due to greater maturity at the first harvest.

The tendency for total sugar content to rise and fall with maturity is one reason why total sugar cannot be used as an index of maturity in the frozen product. Another is the spread for values at any given maturity. Others are the loss of sugar through respiration between harvest and processing, and loss due to leaching during blanching and cooling. Kertesz[14] has shown that as much as 43.5 percent of the total sugar in shelled peas can be lost after six hours at 77 deg. F., and 62.8 percent after 24 hours. Adam and Horner[15] have reported loss of sugar ranging from 9 to 20 percent during one minute of water blanching.

Although sugar content cannot be used, it is important to note

(*Turn to page* 208)

New Food Packaging Problems And How To Handle Them

Experienced companies organize a packaging committee where all new ideas are considered. At meetings, problems are planned and assigned, materials evaluated, cost and production data weighed and final specifications made

By JOHN V. ZIEMBA, Assistant Editor, "Food Industries"

CONCERTED effort is necessary for the development of new packages or for redesigning existing packages in a food processing plant. Through proper organization, all departments are adequately informed of any new packaging developments contemplated or being developed. In addition, each department is assigned its specific functions in the development work.

All new packaging suggestions can be submitted to one organized group—the packaging committee. Members from the operating, quality control and sales departments, who are familiar with the product involved, can decide whether any suggestion justifies research.

Some plants, lacking proper organization for packaging development work, may run into considerable confusion. New packaging suggestions may not be evaluated properly by a staff of "Know Hows." Ideas not worth developing may be investigated, resulting in loss of time and money. Worthwhile ideas may not be developed because they do not reach the proper individuals who can evaluate and initiate the necessary research. Operating, sales, quality control and chemical research and development departments may all be working on different packaging problems simultaneously. Some excellent, some fair and some poor developments may result. Without a packaging committee, who is to judge how good the package is? Who is to judge whether product quality will be protected, shelf-life extended and difficulties encountered during production or the storage, distribution and marketing cycle?

Packaging development work must be organized and controlled in order to eliminate duplication of work in independent departments. Through organization, problems can be evaluated; test procedures issued; performance tests supplemented with organoleptic evaluations, and chemical and bacteriological tests conducted at frequent intervals; retail and consumer acceptance tests arranged; and the new package with specifications turned over to the operating department. Responsibility for undertaking new packaging development work should rest chiefly on the operating department and packaging laboratory. Packaging development work and the evaluation of packages should center around the company's policy of providing the consumer with the highest quality product, packaged economically for consumer sales appeal and repeated consumer utilization.

Packaging Committee Organization

All packaging development work and final evaluation of packages should center in the packaging committee. The personnel of the committee may vary, depending upon the size of the company and its organization. With large food concerns the committee may consist of the following men or their assistants: (1) Product sales manager, representing the sales departments; (2) marketing research manager, representing customer and consumer research departments; (3) development and standardization manager, representing all production departments; (4) quality control manager, representing all quality control departments; (5) director of chemical research and development, representing the research laboratory; (6) general purchasing agent, representing all purchasing departments; (7) manager of the plant engineering department; and (8) advertising manager, representing advertising and sales promotion departments. In addition to the foregoing, who comprise the actual packaging committee, the manager of the consumer service department or an outside agency may act as committee consultant in furnishing scientific evaluation. The packaging committee should have a secretary who reports on all matters taken up at the meetings.

Functions of Packaging Committee

Meetings of the packaging committee should be held at least once a month, sometimes more frequently if the chairman of the committee feels that there is enough business on hand. At the meetings, the following may be taken up: (1) New packaging ideas applicable to the food products handled, (2) status of packaging development work under way, (3) purchase of new machines and equipment for development work and (4) final decisions on packages developed. These matters should be discussed, recommendations made and the necessary action taken. Based on the recommendations of the packaging committee, the chairman of the committee should issue requests for specifications covering:

1. Specifications for packaging materials. The packaging laboratory should set up specifications based upon physical paper tests conducted for tensile strength, wet strength, bursting strength, moisture-vapor transmission and similar tests. Specifications for size and

dimensions of paper and other flexible materials and cartons should also be made. With these specifications, ultimate operating specifications may be drawn up with purchases made accordingly. These specifications should form the basis for cost evaluation in terms of the functional acceptability of competitive materials. Specifications for glass and metal containers should be made in cooperation with suppliers. These should cover size and shape of container and enamel coatings for cans or closures.

2. Specifications for packaging equipment. The engineering department, working together with chemical research and development and operating departments, should draw specifications for the purchase of new machines, such as filling, packaging, labeling and sealing, to be used in mass production.

3. Specifications for the quality of raw materials and finished product. The quality control department should set up complete specifications on the quality of the product to be packaged. Specifications should include raw material, processing, storage and marketing of the finished packaged product.

With these specifications, the chairman of the committee advises the purchasing department to purchase new wrappers, cartons and packaging equipment for development work. Where new designs are involved, the chairman contacts the advertising manager. Through the advertising manager, either the art department or an outside industrial designer is called in to attend a packaging committee meeting when new designs are discussed and recommendations made.

Sources of Packaging Ideas

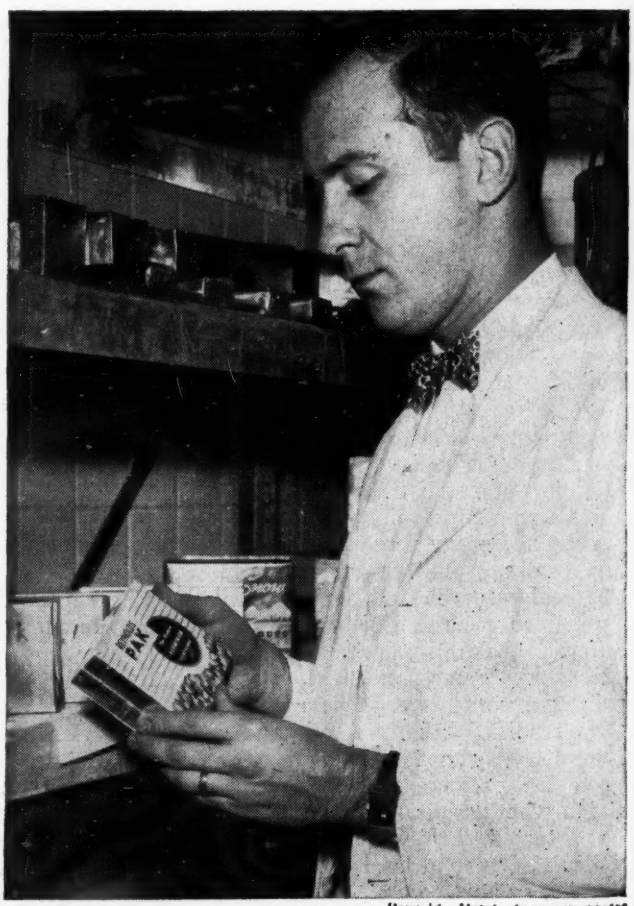
Ideas for new packages or revised design of existing packages may come from many sources. Usual sources are: (1) The field sales force, (2) contacts with manufacturers of packaging material, (3) magazine articles, (4) patent applications, (5) competitors' offerings, (6) sales research department findings, (7) consumer service department data from contacts with housewives in general, (8) advertising department, (9) advertising agencies, (10) package design consultant, (11) packaging conventions and expositions, (12) the company's suggestion box program, and (13) the operating department. Ideas which originate from the operating department usually are for purpose of adjustment to meet specific operating conditions, shipping conditions or other functional requirements.

Handling Packaging Ideas

New packaging ideas, regardless of source, should first be submitted to the packaging committee for approval. At this time, the general sales department interested in marketing the product under consideration is consulted. If the committee and the interested sales department approve the possibilities of the contemplated package, development work must then be initiated.

The chairman of the committee must outline a detailed test procedure which is submitted to the packaging laboratory with copies to all members of the packaging committee. The outline must cover the following: (1) Packaging materials recommended, (2) methods of packaging, (3) specifications on products to be packed, (4) details

Packaging materials must be exact in their physical characteristics and specifications. Here the stiffness of a paper sample is tested in a paper testing laboratory on a Gurley Stiffness Tester.



Reynolds Metals Company photos

By using accelerated storage tests, laboratories can determine the amount of protection packages give foods against moisture pick-up. High temperatures and humidities are employed.

on processing, (5) procedures to follow in carrying packaged products through a cycle simulating commercial production, warehouse storage and alternative methods of distribution and marketing, and (6) physical paper tests.

Packaging Laboratory

At this point the packaging laboratory takes over the experimental work. The packaging laboratory, a division of the chemical research and development department, may consist of a paper testing laboratory and a packaging pilot plant.

If research involves glass or metal containers, the packaging laboratory should undertake the problem with the cooperation of glass or metal container manufacturers. Sales advantages of glass or metal containers should be predetermined by the committee. Glass or metal container manufacturers must then be contacted for assistance on the type of container necessary to protect the product as well as for technical information covering canning operations. Container manufacturers' technicians discuss formulas, container shapes and sizes, labels and enamel coatings for cans or closures. Experimental packs are undertaken either in the container manufacturer's laboratory or the food plant.

If the committee decides that the product must be packaged in a flexible material, then the paper testing laboratory conducts physical paper tests on materials obtained from suppliers. These tests are undertaken to determine the following functional properties of packaging materials, where required: (1) Moisture-vapor transmission, (2) rigidity or flexibility, (3) wet strength, (4) tear strength, (5) greaseproofness, (6) blocking characteristics, and (7) moisture resistance.

In the packaging pilot plant products are packaged in accordance with the test procedure submitted. If equipment is not available in the pilot plant, the chairman of the packaging committee must be notified and approval must be obtained to use existing, usable equipment in the plant. If the manufacturing department has the available equipment, then the chairman must issue instructions to the packaging pilot plant and the manufacturing department covering the day and time of day when the equipment should be made available for pilot plant usage.

At different stages of the investi-

Packaged, frozen foods are taken from storage, weighed and examined.

gation, product quality must be evaluated by a selected organoleptic panel. Depending upon the nature of the product, evaluations may be made in both the cooked and non-cooked state at intervals stated in the test procedure. Simultaneously, samples must be submitted to the control laboratory to determine by required chemical and bacteriological tests the amount of product protection or product deterioration.

Consumer Tests

When the package has been developed and approved, extensive consumer acceptance tests by the consumer panels must be arranged by the marketing research department. These tests must be conducted prior to commercial production and marketing of the finished, packaged product. In some instances outside agencies may conduct country-wide sampling.

Similarly, retail tests must be conducted in various cities by the marketing research department in order to obtain a good cross-section of the acceptance of the finished, packaged product. Outside agencies may handle the retail tests. In both consumer and retail test work, careful planning and supervision must be exercised to exclude any element of bias from the presentation.

In the event that consumer acceptance or retail tests prove unsatisfactory, the committee is advised of the results and decides either to repeat the tests, with or without modifications in the package, or to discontinue further tests and continue with the present package. Depending upon the nature of the problem, there may be other courses to follow. Either new packaging ideas must be considered or other suggestions solicited. Maybe new designs must be considered.

The length of time involved between the receipt of the suggestion and the development of the finished, packaged product varies with the nature of the product. It may take anywhere from one month to one year or possibly even longer to develop a new package.

Products developed in the packaging pilot plant and used for consumer acceptance and retail tests are packaged in the pilot plant or in the plant under its supervision. When all tests have been completed and the committee accepts the new, finished package, pilot plant methods must change over to mass production. The engineering department must consult equipment manufacturing companies for designs and equipment adapted to mass production. From volume estimates furnished by the sales department, the engineering department must make provisions for adequate and economical layout of floor space.

Upon completion of all test work, provided the package adequately protects the quality of the product, shows an improvement over the conventional package, and meets the predetermined sales requirements, the packaging committee approves the new package.

The packaging committee ceases to function after the packaging development work has been completed, and after consumer acceptance and retail store tests have convinced the committee that the new package or revised design has won acceptance. The chairman of the packaging committee turns over the developed package to the manufacturing department. He includes: specifications covering quality control (raw materials and method of processing); packaging materials and equipment; method of packaging; and provisions for layout of floor space. At this point the responsibilities of the packaging committee cease. The manufacturing department orders material, equipment and machines through the purchasing department. Machines and equipment are set up in the floor space recommended by the engineering department and mass production of the new, finished package is started. When the operating or manufacturing department undertakes the first commercial run, the committee should appoint representatives from quality control, chemical research and development and engineering departments to assist as consultants, should operating difficulties arise.

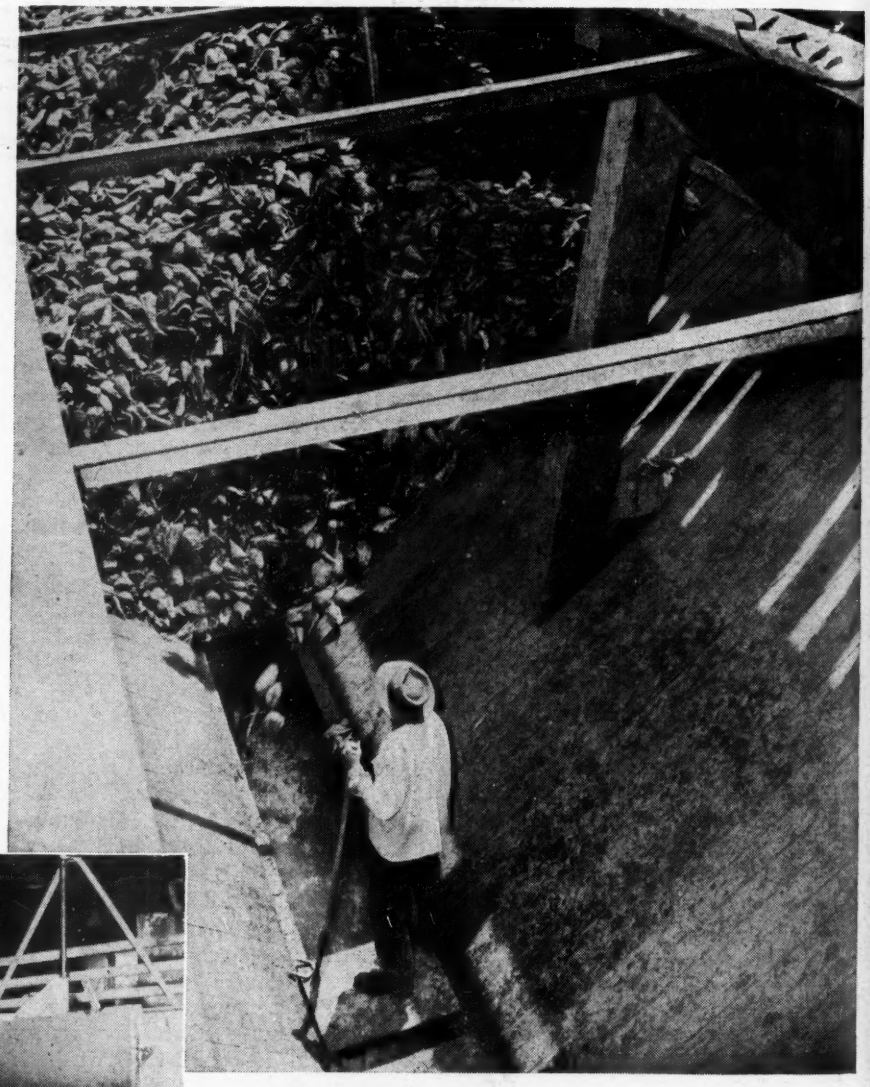
SUGAR IN THE MAKING

Beet production is on the increase after a wartime decline, and sugar from this source will soon be taking its old place in the overall supply. These pictures illustrate the significant operations in the manufacture of sugar from beets

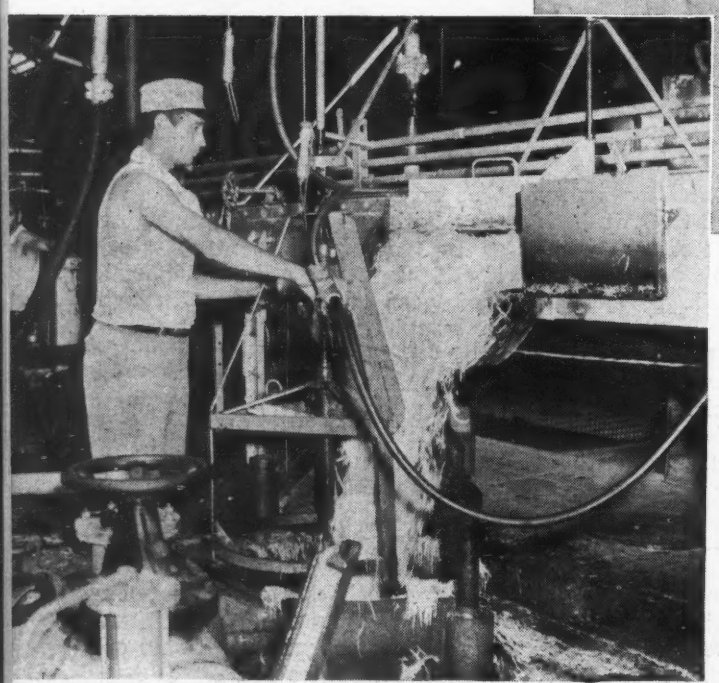
MAKING SUGAR from beets, as all sugar makers know, is simply the process of extracting the sugar laden juices from the beets, purifying these juices and then evaporating off the water, leaving white crystals of pure sugar. The actual process, however, is a little less simple than it can be made to sound. Close controls, for instance, have to be maintained at certain points. And there are other operations that differ markedly from the processes employed in preserving or processing other foods.

Illustrated in this picture story are the special operations used for the extraction and refining of beet sugar. Photographs were taken at the plant of the American Crystal Sugar Co., Oxnard, Calif., and are reproduced through the courtesy of the American Gas Association.

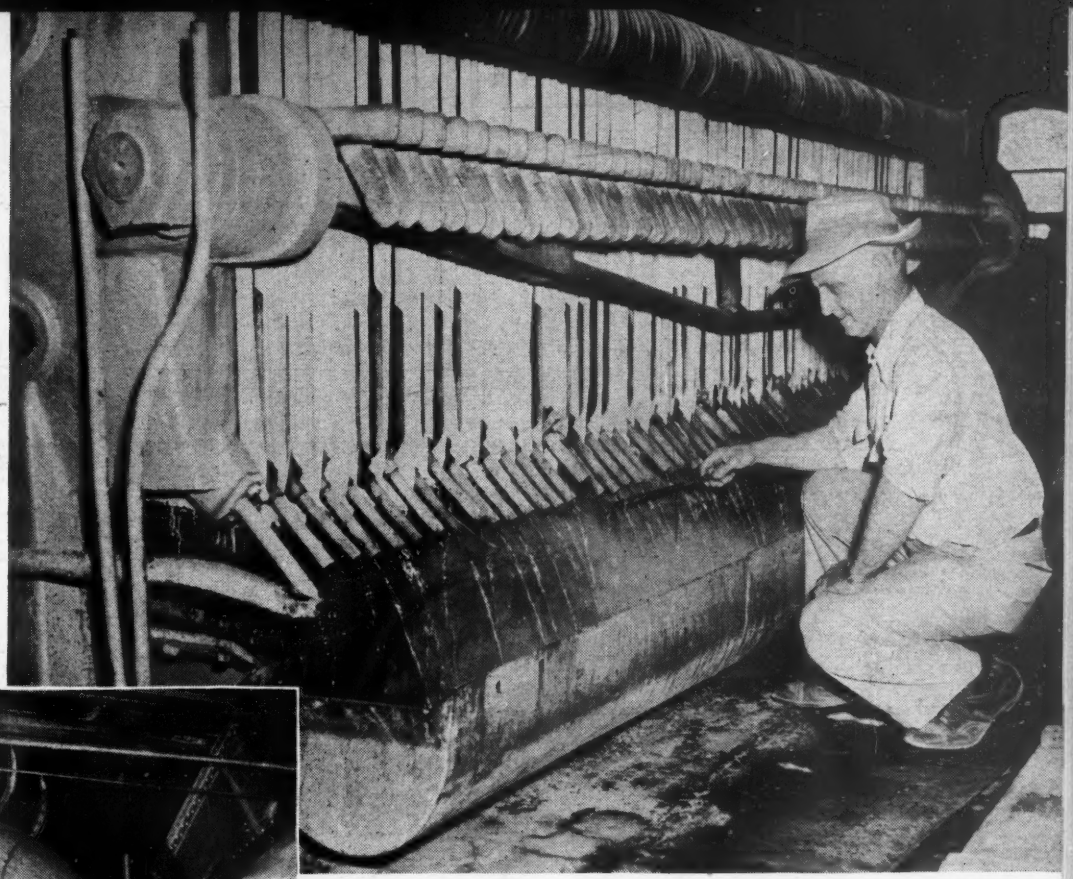
The plant has a capacity of 3,000 tons of beets per day, though actual operation averages about half that quantity.



1. The beets are hauled to the plant by rail or truck. Dumped into receiving bins, they are ready to be flumed into the plant in water flowing through the concrete channel at lower left. This operation both cleans and transports the beets.

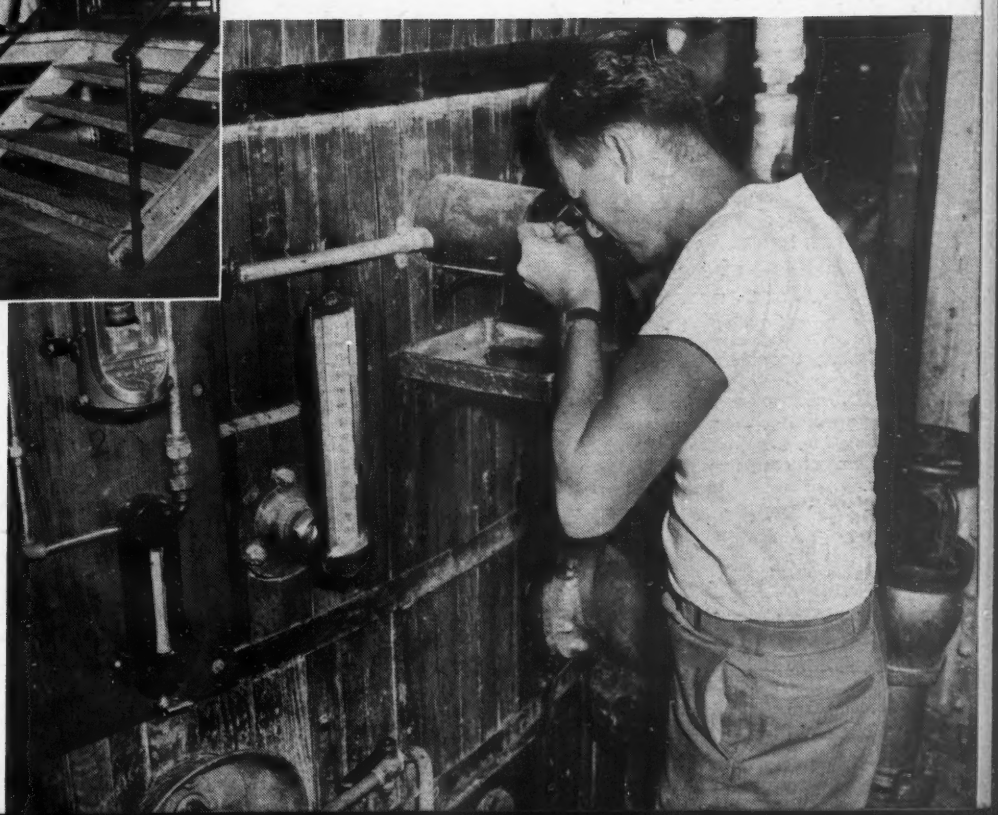


2. After they have been put through a shredding machine, the beets are discharged into the diffusers, a battery of 13 pot-like containers, where hot water at 175 deg. F. is percolated through them to leach out the sugar-containing juices. The water passes through each diffuser in sequence, from the bottom of one to the top of the next. The resulting "diffusion juice" contains about 60 percent sugar. This juice then undergoes clarification. It is heated to about 194 deg. and thoroughly mixed with milk of lime, which has been brought to the same temperature. This makes the solution alkaline. Carbon dioxide is then passed through the mixture, it combines with the lime to form finely divided calcium carbonate.

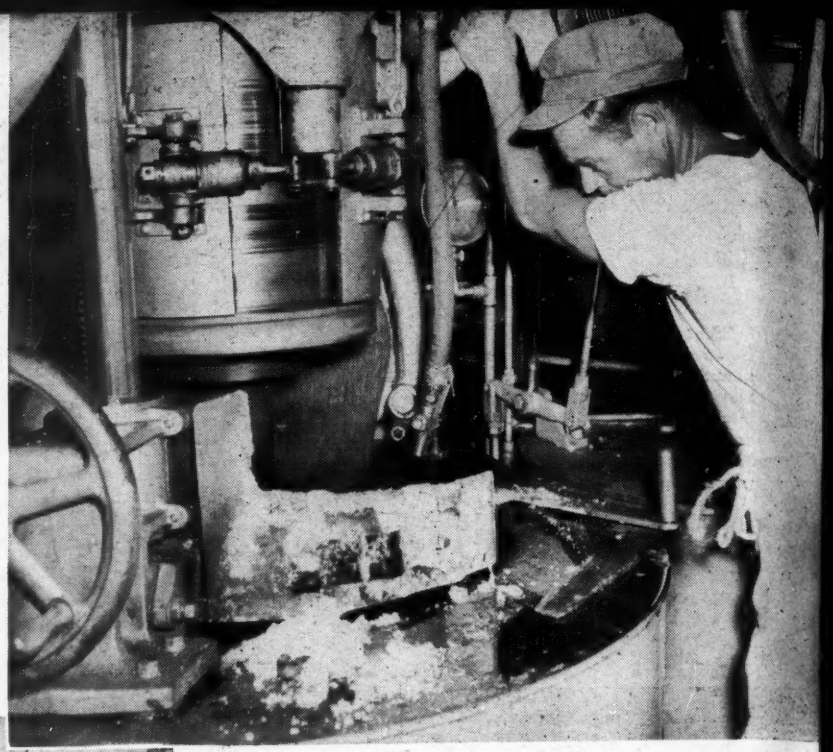


3. A second carbonation is followed by a sulphur compound bleach. The juice is then filtered through double thicknesses of 16 oz. duck and the result is a clear "mother liquor," about 95 percent pure sugar.

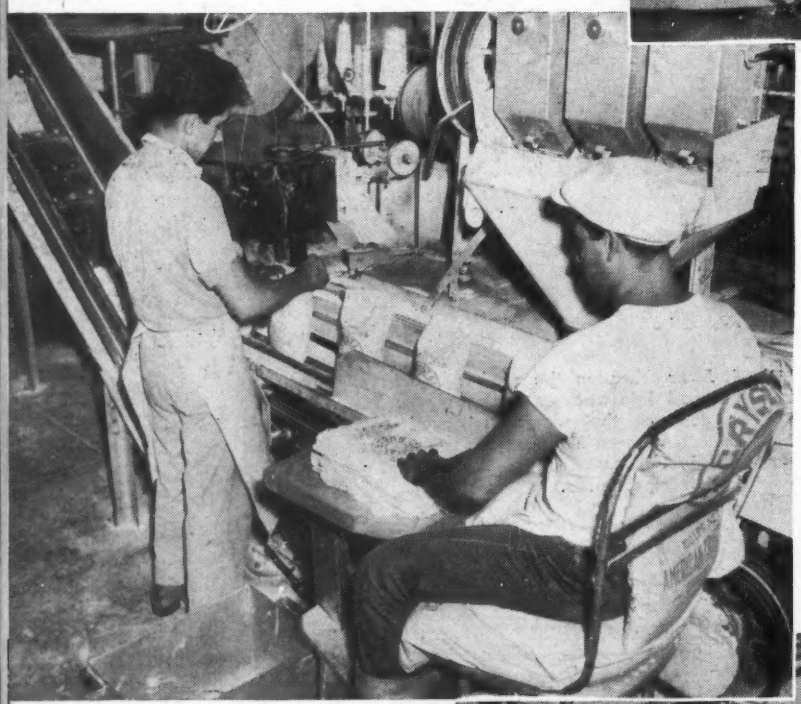
4. After filtration the mother liquor is pumped into vacuum tanks, where 85 percent of the water is boiled off. Low temperature vacuum evaporation avoids decomposition of the sugar by high temperatures.



5. Crystallization is the most critical step in sugar making. As the water boils off in the vacuum, samples are examined frequently to determine the "graining point," the point where the microscopic crystals begin to form. By delicate control of temperature and vacuum, at this point, crystals of uniform size are produced.

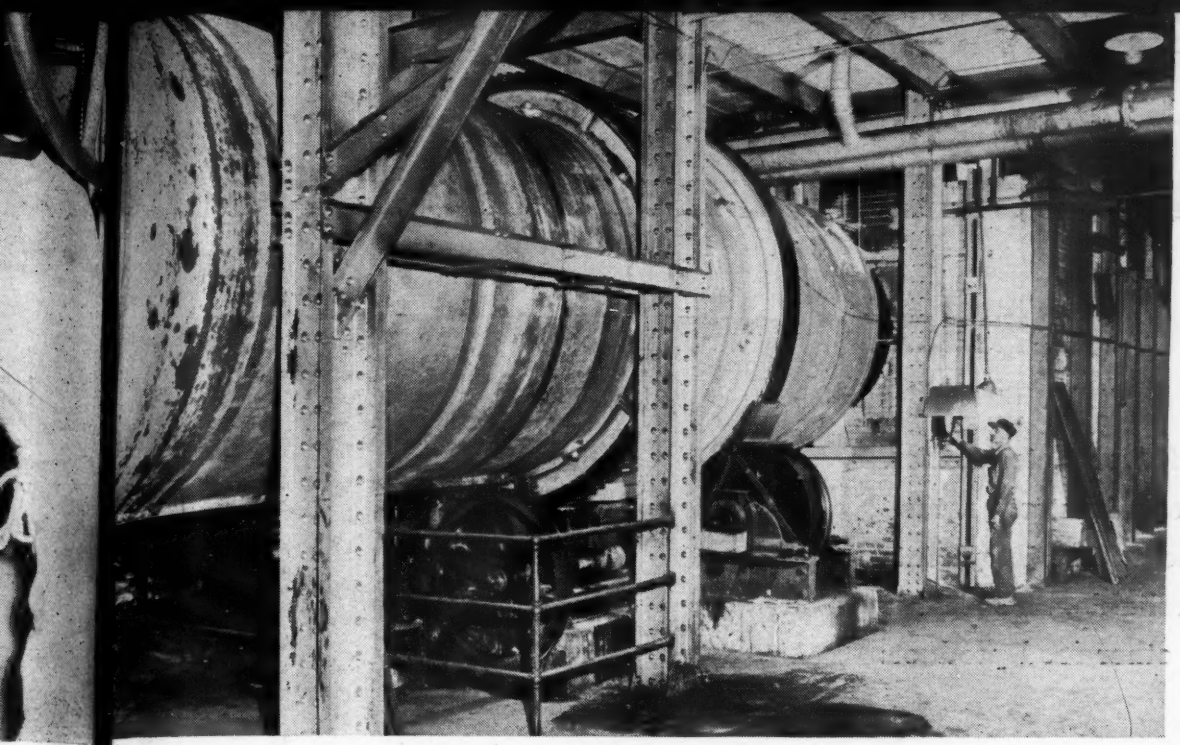


6. When the crystals have reached the right size, the slow pouring film mass, containing them, is dropped into centrifugal driers, operating at 1200 r.p.m. The remaining dark liquid is thrown off, leaving the white sugar crystals.



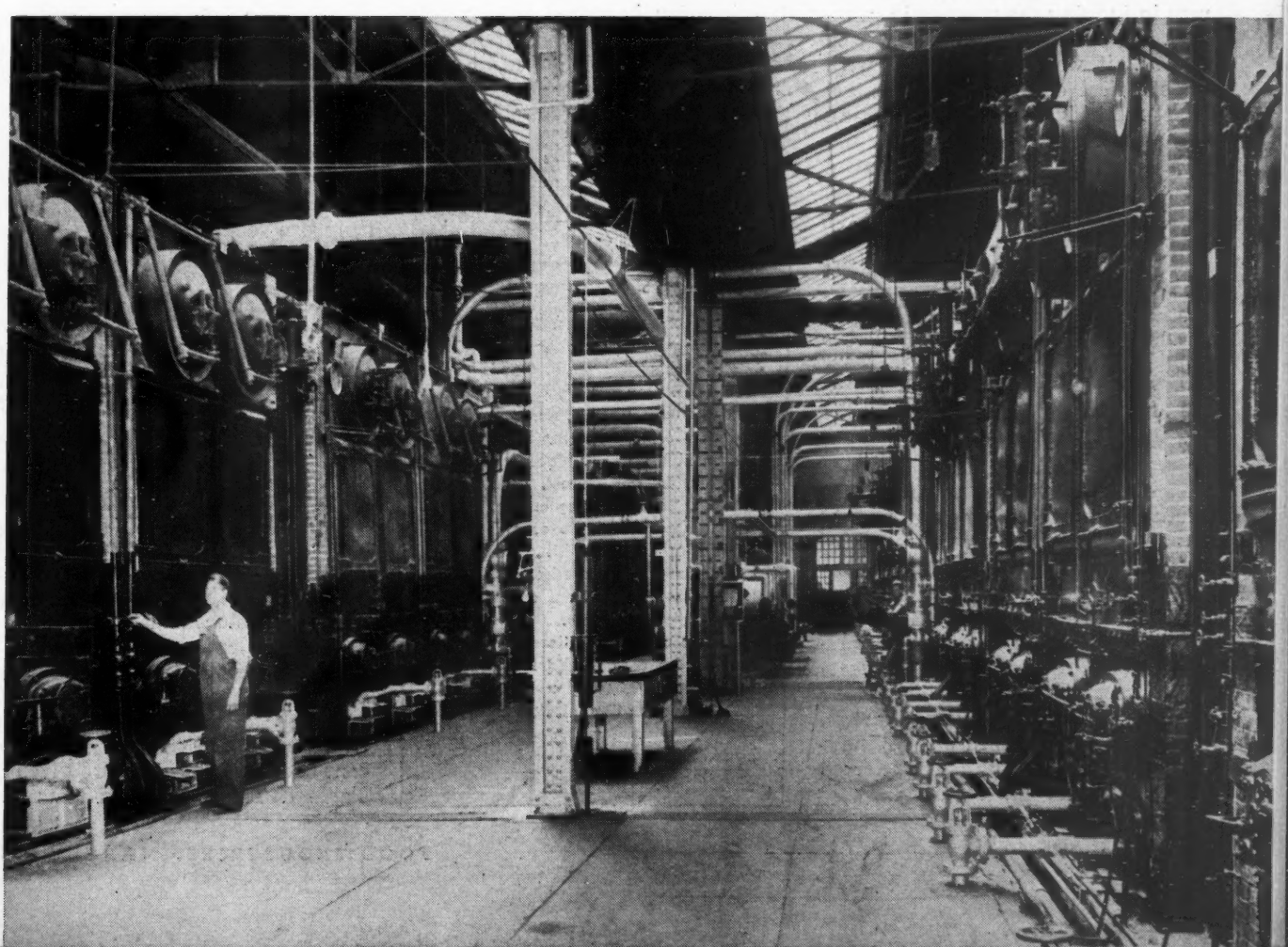
7. After a final drying in gas heated rotary kilns, the sugar is ready for packaging under the company's Crystal Brand label.

8. During beet harvesting, this refinery produces approximately 1,000,000 lb. of sugar per day. This naturally presents a materials handling and storage problem of considerable proportions.



9. The left-over beet pulp is dehydrated in the rotary kilns. This dried pulp becomes cattle feed, which finds a ready market for California herds. Kilns are gas fired.

10. The boiler room of the American Crystal plant utilizes 28 gas fired boilers, of 250 h. p. each. They consume 13,000,000 cu. ft. of natural gas per day when the refinery is operating at full capacity.



Applying Control Chart Methods To Taste Testing

In determining flavor deterioration of dried whole egg in storage, tasters were selected whose judgments were valid and reliable. This technic is applicable to other food products

By SOPHIE MARCUSE, Statistician
Bureau of Human Nutrition and Home Economics,
Agricultural Research Administration, USDA,
Washington, D. C.

A taste panel scoring dried whole egg for flavor quality. U. S. Bureau of Human Nutrition and Home Economics photograph.

WHEN organizing a taste panel for scoring a food product according to a pre-established standard, it is important to know how to select a group of tasters expert in judging the product in question. In a previous paper by the author,[1] it was demonstrated with hypothetical data, that the control chart method[2, 3] can aid in selecting those tasters whose judgments are valid, as defined by the control chart for averages, and reliable, as defined by the control chart for standard deviations.

The present paper describes the adaptation and application of the method under specific laboratory conditions, and shows that in actual scoring a small panel of selected tasters is able to do a better job than a larger group, some of whom may be of doubtful ability. It thus appears that using a taste panel selected by the control chart method has practical advantages in the testing of food products.

The study was carried on in conjunction with an analysis of flavor quality of dried whole egg in an effort to determine which, of various types of carbohydrate treatment, retards taste deterioration most effectively during storage. Conclusions are based on the judgments of a tasting panel selected by the control chart method.

The statistical analysis presented demonstrates the superior sensitivity of that judging panel. It shows that they were able to discriminate between the rates of taste deterioration in stored dried whole egg treated with two types of carbohydrate before dehydration. The analysis also shows that the differential results secured from the small selected panel agreed with findings based on physical measurements, whereas results from the larger unselected panel did not.

CONTROL CHARTS

In previous articles: "Systematic Sampling Pays In Controlling Filling Weights," by H. P. Goode and George I. Dundas, *Food Industries*, 98-100, December, 1945; and "Statistical Control Of the Production Process," by A. M. Mood, *Food Industries*, 93-95, August, 1946, and 104-106, 222, 224, September, 1946, the application of the control chart method to container-fill control has been discussed, together with detailed instructions on constructing and using the charts.

In this article a different application of the control chart method is described: Selecting a taste panel for the evaluation of flavor deterioration in various types of carbohydrate-treated dried whole egg stored at 100 degrees F.

Experimental Procedure

The group of tasters consisted of seven persons, made familiar with scoring storage flavor in dried egg through preliminary training. Experim ntal samples, pretreated with 10 percent sucrose and with 10 percent lactose, were stored at 100 deg. F. for 0, 1, 4, 8, and 16 weeks. Similarly pretreated dried eggs, stored at 0 deg. F., were used as control or check samples. Each sample was prepared as scrambled egg. The control samples had been prescored by experienced tasters, who had calibrated their scoring system by comparison with dried egg samples of known histories.

Selection of Taste Panel

A control chart analysis was made of the scores reported by all seven tasters for the control samples (carbohydrate-treated dried whole egg stored at 0 deg. F.) in order to select the tasters capable of most valid and reliable scoring. Separate control charts were set up for each treatment. Data for setting up the charts for the 10 percent sucrose treatment are given in Table I. The number of tests (n)

made by an individual taster varied from 7 to 9. Corresponding control charts for averages $(\overline{X})$ and for standard deviations (σ) are shown in Fig. 1.

Standard value $\overline{X}'$ and σ',[4a] necessary for setting up control charts for $\overline{X}$ and σ were obtained in the following way using the notation and formulas of the American Standards Association.[4, 5]

1. The standard value $\overline{X}'$ was specified as the pre-established value of the control sample (prescored by experienced tasters). The value of $\overline{X}'$ for the 10 percent sucrose treatment was 7.4.

2. The standard value σ' was derived from the performance of the tasters themselves by using the average value of (observed σ)/c_2 for the individual samples, where c_2 denotes a constant that varies with n, the number of observations in the sample (in this case, the number of tests made by the individual taster). Only the two smallest standard deviations were included, $\sigma = .28$ and $\sigma = .34$ as shown in Table I, thus yielding:

$$\sigma' = \tfrac{1}{2}\left[\frac{0.28}{0.8882} + \frac{0.34}{0.9139}\right] = 0.345$$

By utilizing the two smallest observed σ values, instead of all seven, a higher standard of performance was set: that is, a low amount of variability in taste-scoring was allowed on the control samples.

On the basis of these standard values, the central lines and control limits, to be used for constructing the control charts for averages and standard deviations, were computed in the following way, where $A = 3/\sqrt{n}$, $B_1 = c_2 - 3/\sqrt{2n}$, $B_2 = c_2 + 3/\sqrt{2n}$ and n = the number of tests:

Central Lines

For $\overline{X}$: $\overline{X}' + 7.4$

For σ:

$n = 7$, $c_2\,\sigma' = (0.8882)\,(0.345) = 0.31$
$n = 8$, $c_2\,\sigma' = (0.9027)\,(0.345) = 0.31$
$n = 9$, $c_2\,\sigma' = (0.9139)\,(0.345) = 0.32$

Control Limits

For $\overline{X}$:

$n = 7$, $\overline{X}' \pm A\sigma' = 7.4 \pm (1.134)\,(0.345) = 7.79$ and 7.01
$n = 8$, $\overline{X}' \pm A\sigma' = 7.4 \pm (1.061)\,(0.345) = 7.77$ and 7.03
$n = 9$, $\overline{X}' \pm A\sigma' = 7.4 \pm (1.000)\,(0.345) = 7.75$ and 7.06

For σ:

$n = 7$, $B_1\sigma' = (0.086)\,(0.345) = 0.03$
$B_2\sigma' = (1.690)\,(0.345) = 0.58$
$n = 8$, $B_1\sigma' = (0.158)\,(0.345) = 0.05$
$B_2\sigma' = (1.653)\,(0.345) = 0.57$
$n = 9$, $B_1\sigma' = (0.207)\,(0.345) = 0.07$
$B_2\sigma' = (1.621)\,(0.345) = 0.56$

Figures for central lines and control limits are applied in setting up the control charts for averages $(\overline{X})$, and standard deviations (σ) in Fig. 1, as follows: The individual tasters are indicated on a horizontal scale and the statistical measure $\overline{X}$ or σ on a vertical scale. For each taster the central line is drawn as a horizontal solid line and the control limits as horizontal dotted lines. The corresponding averages $(\overline{X})$ and standard deviations (σ) for the tasters, given in Table I, are plotted as dots to be examined for falling inside or outside the control limits. For instance, on the control chart for standard deviations, taster 1 who made n = 8 tests, has 0.31 as a central line, 0.57 as an upper limit and 0.05 as a lower limit.

The control chart method singles out as most reliable and valid those tasters whose average scores and standard deviations are within the control limits of the respective charts. Tasters 2 and 7 (Fig. 1), fulfill the requirements for both validity and reliability, whereas the others do not; for example, the scoring of taster 5 proves to be reliable (i.e., within the control limits on the control chart for standard deviations), but not valid (i.e. not within the control limits on the control chart for averages).

TABLE I.—Flavor Scores of Seven Tasters on Dried Whole Egg Samples (10 percent Surose-treated) Stored at 0 deg. F.

Taster No.	Scores* on test No. 1	2	3	4	5	6	7	8	9	No. of tests (n)	Average score $(\overline{X})$	Standard deviation (σ)
1.....	...	5.0	5.0	7.0	7.0	7.0	3.5	6.0	7.0	8	5.9	1.24
2.....	7.0	...	...	7.0	7.5	7.5	7.5	6.8	7.0	7	7.2	.28
3.....	7.0	7.5	6.0	7.0	7.0	7.5	5.5	7.0	7.0	9	6.8	.62
4.....	9.0	8.0	9.0	8.0	7.5	7.0	7.5	5.0	7.0	9	7.6	1.14
5.....	7.0	7.0	6.5	6.0	6.0	7.0	7.0	...	...	7	6.6	.44
6.....	8.0	5.0	8.0	7.0	6.0	8.0	5.5	...	...	7	6.8	1.19
7.....	7.0	7.0	7.5	7.5	7.5	6.5	7.5	7.5	7.5	9	7.3	.34

* Maximum score 10.0; minimum score 1.0

Comparison of Performance

Using the experimental samples (10 percent lactose-treated and 10 percent sucrose-treated dried whole egg stored at 100 deg. F.) the judgments of the tasters selected by the control chart method were compared with the judgments of all seven tasters. The flavor scores were averaged for each storage period. In addition, measurements showing increase of fluorescence, which has been found to be related to flavor deterioration due to storage, were analyzed. Table II gives the average flavor scores of all seven tasters and of selected tasters for the two products (10 percent lactose-treated and 10 percent sucrose-treated dried whole egg) after storage at 100 deg. F. for 0, 1, 4, 8 and 16 weeks. Fluorescence readings are also given.

Statistical analysis demonstrates that the flavor ratings of selected tasters corroborate the fluorescence readings, showing a pronounced difference between the two products in rate of taste deterioration, whereas the average flavor scores for all tasters do not.

Rate of Deterioration

The rate of deterioration of dried whole egg during storage can be expressed by the slope of a linear regression line $Y' = a + bX$[6a] fitted to the points: (X = storage time, Y = test value), Y′ denoting the estimated test value. The coefficient of regression, b, measures the slope of the regression line, and therefore the rate of deterioration during storage. Fig. 2 shows the regression lines corresponding to the points presented in Table II.

To compare the rates of deterioration for the two products, based on each of the three types of testing, it is necessary to test each time the significance of the difference between the two corresponding re-

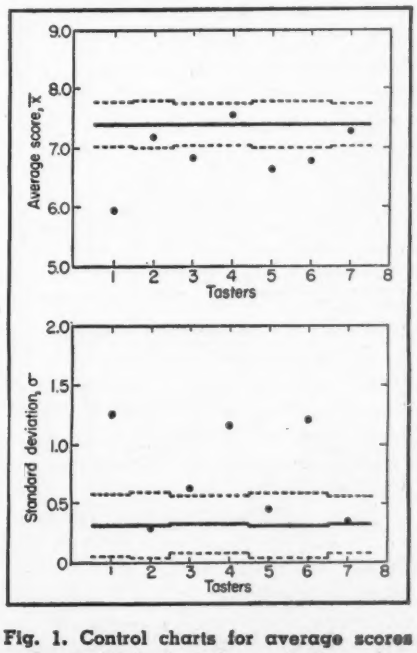


Fig. 1. Control charts for average scores and standard deviations of the seven tasters on flavor of stored dried eggs. Note that tasters 2 and 7 are the only ones that fall within the control limits on average scores and deviations.

TABLE II.—Average Flavor Scores and Fluorescence Readings, on Dried Whole Egg Samples

Storage time weeks	Average flavor scores* All tasters	Average flavor scores* Selected tasters	Fluorescence readings
10 percent sucrose added			
0	6.9	7.0	8.5
1	6.5	6.9	10.3
4	6.5	6.2	22.0
8	5.9	5.8	26.0
16	4.6	4.1	44.0
10 percent lactose added			
0	6.8	7.0	10.8
1	6.8	6.9	12.5
4	6.6	7.1	16.5
8	5.9	6.8	21.0
16	5.3	5.8	26.0

*Maximum score 10.0; minimum score 1.0

gression coefficients. The following test of significance was used:

Denote any pair of regression lines by

$$Y'_1 = a_1 + b_1X,\ Y'_2 = a_2 + b_2X$$

where Y′ represents the estimated value of Y, and consider the expression

$$\frac{b_1 - b_2}{\sqrt{\frac{\Sigma(Y_1 - Y'_1)^2 + \Sigma(Y_2 - Y'_2)^2}{3\,(\Sigma X^2 - (\Sigma X)^2/5)}}}$$

representing the difference between the regression coefficients divided by the estimated standard deviation of the difference.[6b] This ratio is distributed in Student's "t' distribution with 6 degrees of freedom, on the assumption that the error variation of the Y's is normally distributed. The ratio "t" for the scores of all tasters, selected tasters, and fluorescence readings respectively are:

$$t_a = 2.122,\ t_s = 5.096,\ t_f = 5.724$$

with 6 degrees of freedom. Tables of probabilities, corresponding to "t" values[6c], show that t_a is not significant since the 5 percent value of "t" for 6 degrees of freedom is 2.447. Both t_s and t_f, however, are highly significant at the 1 percent level of significance ($t_{.01} = 3.707$).

In the case of average flavor scores for selected tasters ($t_s = 5.096$) and fluorescence readings ($t_f = 5.724$), the difference in slope for the two products is significant at the 1 percent level; in the case of average scores of all tasters ($t_a = 2.122$) it is not significant at the 1 percent level. This shows that the panel selected by the control chart method was able to discriminate between the two differently treated products, and that the degree of difference is in agreement with results from fluorescence measurements. It also shows that the panel of all seven tasters was not able to discriminate between the two products.

Summary and Conclusions

Performance of a tasting panel, consisting of seven tasters with preliminary training in scoring storage flavor of dried egg, was analyzed in an experiment on stored dried whole egg treated with 10 percent sucrose and 10 percent lactose, and compared with that of a small group of tasters selected by the control chart method. The selected tasters were more efficient in discriminating power than the panel of all tasters, and their results agreed with results based on physical tests. It may therefore be concluded that:

1. It is more accurate to base the flavor evaluation of carbohydrate-treated dried egg samples on the average scores of the tasters selected by the control chart method, than to include scores of doubtful value.

2. In continued work on the same kind of product, tasters should be eliminated who have been disqualified by the control chart method.

3. It is desirable to use data from only competent judges selected by the control chart method, especially if objectively measurable physical or chemical changes known to correlate with flavor deterioration have not been developed.

Although this evaluation of the control chart method for selecting a tasting panel is based upon data from carbohydrate-treated spray-dried whole egg, the technic is equally applicable to other standardized food products.

The work of "Student", referred to in this article, was discussed in an article which appeared in the June, 1946, issue of Food Industries under the title "What Constitutes an Adequate Sample?". Present day statistical methods are based on "Student's" pioneer publication in 1908.—The Editors.

References

1. S. Marcuse, An Application of the Control Chart Method to the Testing and Marketing of Foods. *Journal American Statistical Association,* 40, 214-222, 1945.
2. W. A. Shewhart, "Economic Control of Quality of Manufactured Product." Van Nostrand, 1931.
3. W. A. Shewhart, "Statistical Method from the Viewpoint of Quality Control." W. E. Deming, 1939.
4. "Guide for Quality Control and Control Chart Method of Analyzing Data," American War Standard Z1.1 and Z1.2, 66, 1941, American Standards Association, New York, N. Y. (4a) p. 37.
5. "Control Chart Method for Controlling Quality During Production," American War Standard Z1.3, 40, 1942. American Standards Association, New York, N. Y.
6. P. R. Rider, "An Introduction to Modern Statistical Methods." John Wiley & Sons, 1939. (6a) p. 27-30, (6b) p. 89 and 95, (6C) p. 200-201.

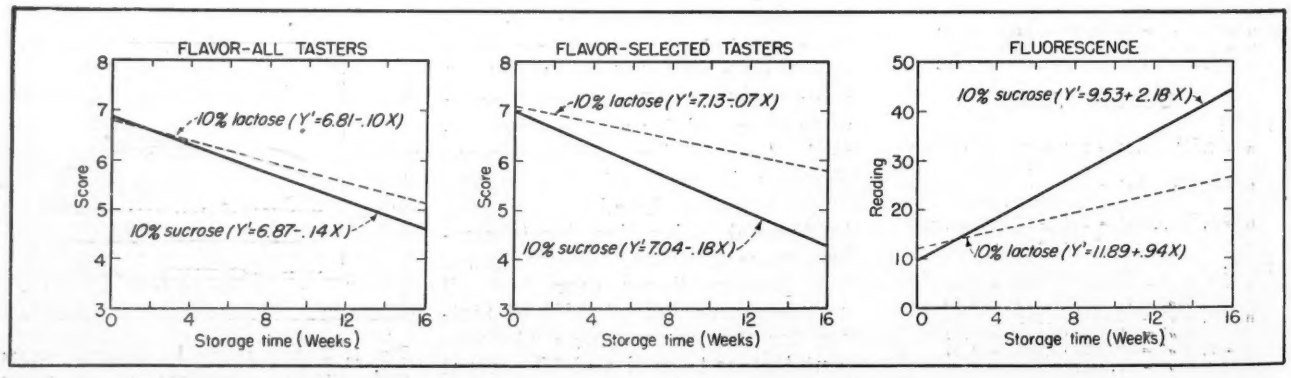


Fig. 2. Regression lines showing rates of deterioration in flavor of carbohydrate-treated dried egg stored at 100 deg. F. (Left): Average scores of all tasters. (Center): Selected tasters. (Right): Fluorescence readings, which are related to flavor deterioration due to storage. Similarity between slopes of lines for selected tasters and fluorescence reading shows that the selected tasters were able to detect the degree of difference between the differently treated products, whereas the larger panel was not.

Canners Convention Highlights

Industry caution and continuing shortages of cans indicate some decrease in pack from the 1946 high, with emphasis on top quality products. New equipment and processes are offered for corn, tomato and other products

FOOD INDUSTRIES Staff Report

NOTHING like the lugubrious situation reported by some of the daily newshawks at the Atlantic City convention of the National Canners Association came to our attention after spending five days covering the conventions that cluster around the N.C.A. meetings. One had to read his home town newspapers to discover the gloom and pessimism that are alleged to have pervaded the entire atmosphere of the convention.

There was, however, a note of wariness and caution, bred of price declines that were the subject of comment on all sides. Perhaps some branches of the food industry would be happier today if the OPA ceilings had been retained and prices had not taken their rapid rise last autumn.

The problems of the Florida citrus canners were freely discussed, and the general feeling was that the situation could be diagnosed in three words—"Too much fruit."

Shortage of steel and tin may make it impossible for the industry to overpack in 1947. In fact, the National Meat Canners Association made a tremendous plea to steel makers and can makers for enough tin cans to permit it to get back to civilian operations. Meat canners had gone all out for war, and say that they are now exactly like a returning GI who cannot get a job. It's all because the allocation of tin cans for meat operations is down to 60 percent, thus leaving "empty retorts and idle plants."

Exemplifying the wariness of vegetable canners, several told us that they were planning to pack nothing but top quality products in 1947. They would let somebody else supply the lower grades on which there will be scanty profit margins this year.

From the sellers of seeds for canning crops one gains the important information that there has been a marked decline in seed sales to canners. This is interpreted as probably indicating reduced production of vegetable canning crops this year. Nevertheless, there is no way of knowing how much seed has been carried over in canners' hands from the 1946 season.

Machinery Exhibit

The huge size of the machinery exhibit made it impossible for one person to cover everything. Here are a few things at the exhibit that aroused our interest in the brief time available and called for further study. An important development for canners was American Can Company's demonstration of vacuum canning followed by an agitating process (the "agitating-vacuum process") that produced a much lighter and better flavored product than the still cooks. It is an interesting speculation as to what would occur if the preparation method for sweet corn developed by the United Company were to be coupled with the American Can Company's new sterilizing process.

The United Company's new system of washing and handling whole kernel corn gets rid of all silk, cob fragments, embryos and borers. Also new is United's method of making a cream style canned corn by combining corn of maturities differing by two weeks, following washing by the new system. In order to get the flavor and starch needed for proper consistency, the washed kernels of the older corn are crushed to produce the cream, then mixed with the kernels of the more tender corn. It produces a very tasty item. Flavor derived from the older kernels, plus the tender kernels from the younger corn, compared to one of the best known brands on the market and—well, there is still something new in corn canning. An oddity is that this "built up" cream style corn does not turn dark on standing, a fact for which an explanation is still being sought.

Food Machinery Corporation had a new volume package-filling line for frozen foods that not only uses a low cost carton, without a liner, made by Marathon, but also operates at a speed much higher than the older available filling machines. At present there seems to be no overwrapping machine that can keep pace with it when the variable speed drive for the filling line is set at its maximum rate.

Lee Metal Products Company showed hydraulic lifts for stirrers on kettles and hydraulic operated tilting kettles. Also a new design of kettle that meets the exacting sanitary standards of the New York City Department of Health.

Continuous processing equipment for tomato juice was shown by Chain Belt Company, Walker-Wallace Company, and Food Machinery Corporation. There is intense rivalry in this field for low cost production. Chain Belt's was on view for the first time.

Continuous evaporation for tomato pulp and tomato paste is now available. Buffalo Foundry & Machine Company's double effect evaporators employ forced circulation through the heating tubes. The rate of travel is so rapid that there is no troublesome "cooking on" and, instead of cleaning up after every batch, the tubes need to be cleaned only once a week when the operation is continuous. One can foresee a day when catchup manufacture will also be a continuous process.

Anchor-Hocking Glass Company showed its new equipment for sealing glass jars by injecting superheated steam into the neck of the jar and closing the jar by a continuous operation.

"Dry" labeling, shown by New

(*Turn to page* 212)

Edible Oil Industry In Germany

PART II—German oil refining is batchwise and not continuous like ours. Soybean oil reversion, a common problem, is combatted by the removal of lecithin or with live steam. Fatty ethyl esters were added to margarine

By W. H. GOSS, Northern Regional Research Laboratory, Peoria, Ill.

THE general method of converting crude oils into edible products is nearly the same in Germany as in the United States. It consists of neutralizing the free acids, removing the resulting soaps, bleaching, hydrogenating a certain proportion of the oil, removing odorous constituents by steam distillation under vacuum, and blending with other ingredients to make margarine. Most oilseed mills are operated in conjunction with refineries in which a large part of the production of crude oil is processed, and a very few include additional facilities for making margarine. Nearly all of the margarine is manufactured, however, in separate plants whose operators purchase hardened and unhardened oils from the refineries.

Refining Edible Oils

Chief objective of the German refining process is to produce "hard" and "soft" oils. The former, known as *crisco**, is used for blending to make margarine. *Crisco* is usually hydrogenated whale or peanut oil, but hardened rapeseed, soybean, and other oils are used to some extent in this product. Coconut and palm-kernel oils are the hard fats in many of the better grades of margarine. Hard oils are hydrogenated to a melting point of 40 deg. to 42 deg. C. in the summer and 30 deg. to 32 deg. C. in the winter. A half-hardened oil, melting at 34 deg. to 36 deg. C., is also used between seasons, and for blending with certain types of soft oils. The ratio of hard to soft oil in margarine is 60 to 40 in most cases, but occasionally it is 65 to 35.

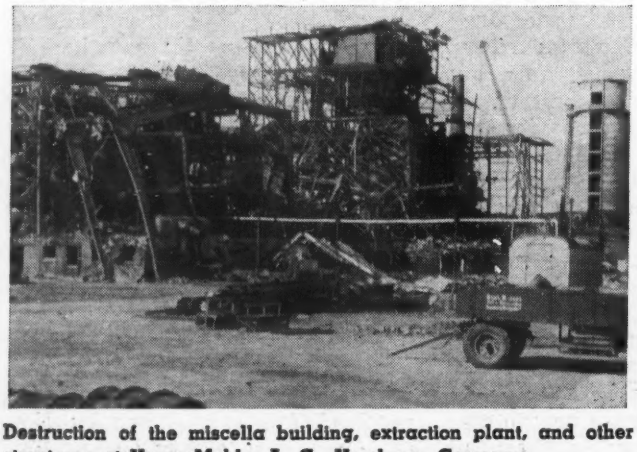
* *Crisco* in German terminology refers to any hardened fat, usually vegetable, which is mixed with other fats in the manufacture of margarine.

Batch Operations

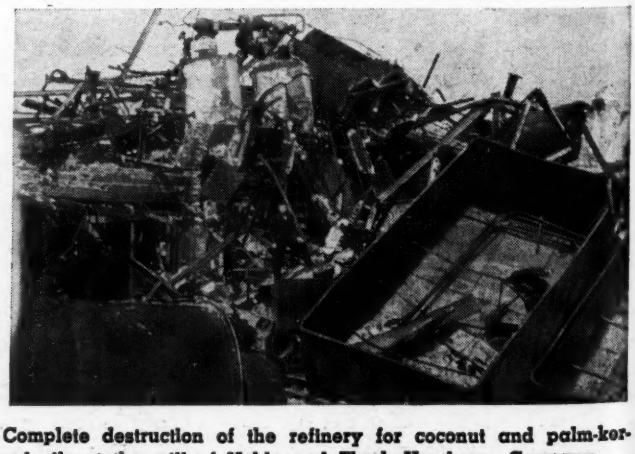
German refiners conduct practically all their operations batchwise and are averse to using continuous methods like those used in the United States. Neutralization is always done in kettles which have heating coils or jackets in the bottom and spray heads for admitting lye and water at the top. Most of them have mechanical stirrers, but in some cases agitation is obtained by blowing steam, or even air, through nozzles in the bottom. The more modern kettles are equipped with closed tops so that neutralizing, washing, drying, and bleaching under vacuum can be carried out without transferring the oil to other apparatus.

In the production of soft oils, it is common to neutralize with an amount of lye equivalent to the free fatty acid and to follow with one or more washings with a solution of soda ash. The temperatures during this step of the process vary from plant to plant and range from 60 deg. to 100 deg. C. Residual soaps are removed by washing three or four times with hot water, and the oil is then dried under vacuum. Practically all bleaching is also conducted under vacuum, frequently in the same kettle used for the preceding operations in the refining. It is customary to use one to two percent of activated earth, depending upon the quality of the oil, at a temperature of 80 deg. to 100 deg. C. After contact with the earth for about 30 minutes, the oil is filtered through the plate-and-frame type of presses.

The neutralized oil contains 0.04 to 0.10 percent of free acids. Soybean oil is bleached to a Lovibond red value of 1.2 to 3.5, usually about 2.0, and rapeseed oil to approximately 0.1 red. The entire process of neutralizing, washing, drying,



Destruction of the miscella building, extraction plant, and other structures at Hansa-Muhle, A. G., Hamburg, Germany.



Complete destruction of the refinery for coconut and palm-kernel oils at the mill of Noble und Thorl, Hamburg, Germany.

and bleaching requires 10 to 12 hours, and in many plants the equipment handles two batches a day.

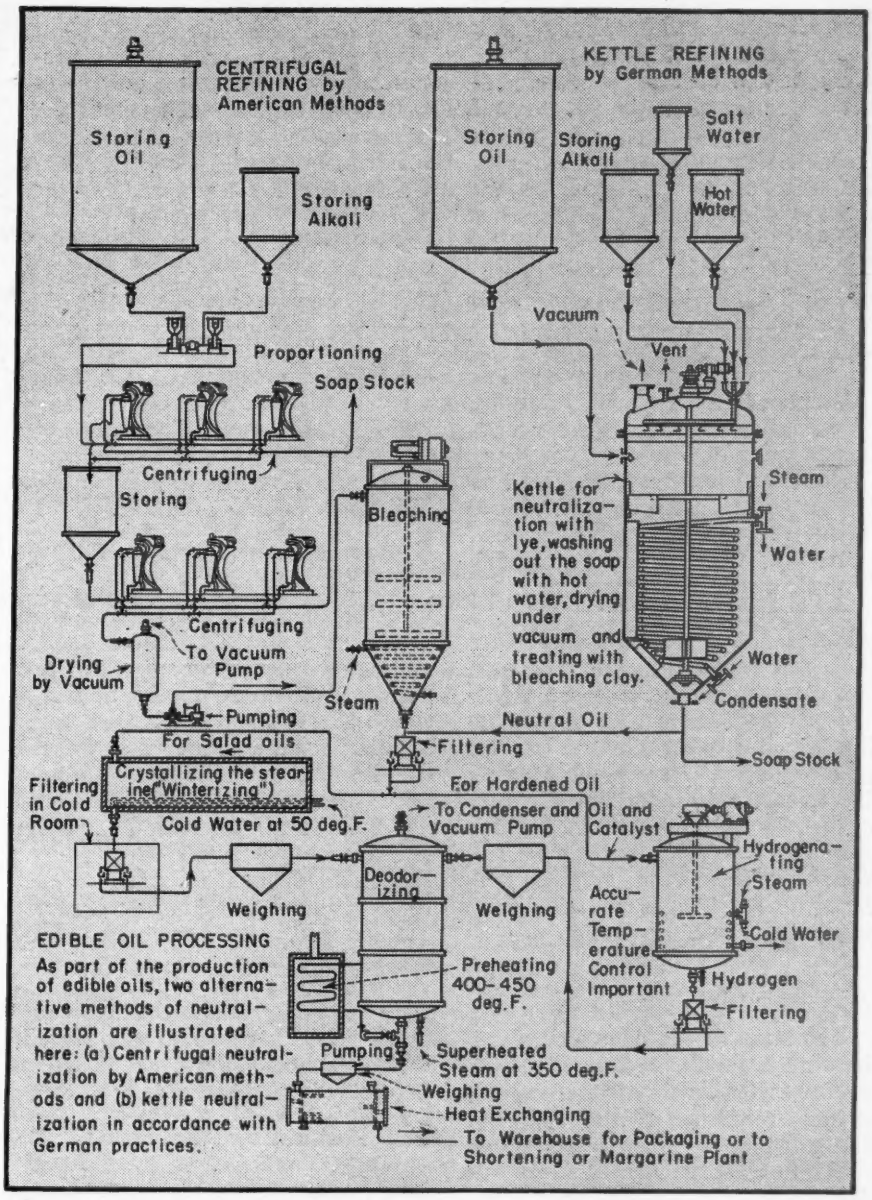
Deodorizers

German deodorizers are similar to the batch type used in American refineries. Most oils are treated for six to eight hours at 150 deg. to 160 deg. C., a temperature somewhat lower than that used in this country. With soybean oil, the temperature is 15 to 20 degrees higher and the time of processing two to three hours longer. A vacuum amounting to 2 to 10 mm. of absolute pressure is maintained, ordinarily by means of reciprocating pumps. A number of refineries use the Lurgi deodorizers in which oil is treated in two stages, first in a primary still and then in a "finishing" vessel, and the steam flows countercurrently through them. The consumption of direct steam, which is always superheated, is about the same as in American plants. In a typical refinery, the final content of free fatty acids is 0.02 to 0.04 percent in unhardened soybean oil and 0.04 to 0.05 percent in soft rapeseed and peanut oils.

Hydrogenation

The objective of hydrogenation in Germany is quite unlike that of American refiners, for the end product is almost entirely margarine produced by blending hard and soft oils. In this country emphasis has been placed upon the selectivity of the nickel catalyst toward production of a minimum amount of iso-oleic acid, but German operators desire a maximum content of this acid in their products. The most widely used catalyst, therefore, is that obtained by reducing nickel formate in the oil at a temperature of 240 deg. to 260 deg. C. In a few plants dry-reduced nickel on kieselguhr is employed. The amount of catalyst is usually 0.1 to 0.2 percent of the weight of oil. It is used and reused almost indefinitely, frequently 40 to 60 times, but in most cases about five percent of it is withdrawn after each cycle and replaced with freshly prepared nickel.

Converters of many designs are in use, and the operating pressures vary from 3 to 30 atmospheres. Agitation in some is obtained by spraying hydrogen in at the bottom, and others contain various types of mechanical stirrers. Typical operating conditions include a temperature of 200 deg. C. and a time of about four hours. Most plants use electrolytic hydrogen produced in cells containing aqueous potassium hydroxide, but the steam-iron process is employed to some extent.



Flow sheet showing American and German methods of manufacturing salad oils and hydrogenated oils. Winterizing and hydrogenation are omitted in the preparation of cooking oils. The hydrogenated oils, after deodorization and cooling, are mixed with the other ingredients, and mechanically processed to produce margarine and shortening.

Rather unusual procedures are sometimes followed in refining and hardening oils containing low percentages of free fatty acids, particularly soybean oil. One of these is hydrogenation before neutralization, in which case much of the color disappears, and the subsequent bleaching is effected with greater ease. It is necessary to remove the mucilaginous materials completely in order to prevent poisoning the catalyst, but this is regularly done anyway in practically all the German soybean mills. In some refineries, too, crude oils containing very little free acid are blown with air while being neutralized, the author has not discovered the virtue, if any, of such mistreatment.

Production of Margarine

Before the war, German margarine consisted of about 18 percent of ripened skim milk blended with hard and soft fats and numerous minor ingredients. In typical products there were included approximately one percent salt, two percent glucose, 0.2 to 0.5 percent potato starch, 0.5 percent lecithin, 0.005 percent carotene, and enough fish-liver oil to raise the vitamin A potency to 20 I. U. per gram. Regulations required inclusion of the starch as an indicator to facilitate the detection of margarine, and for

a time five percent of sesame oil was incorporated for the same purpose. Many of the best pre-war margarines contained soft peanut oil mixed with coconut, palm-kernel, or hardened peanut oil. Cheaper grades consisted of hardened whale oil blended with unhardened soybean oil and the other usual ingredients. During the war it became necessary to replace the ripened milk with water and diacetyl.

Various Methods Used

Many methods of varying degrees of antiquity are in use for manufacturing margarine. In the most modern and widely used, the fats and ripened milk, or water, are mixed first in specially designed churns, of which there are usually several which operate alternately. This operation requires only 15 minutes, after which the mixture is passed over a chill roll. The next two steps in the process are a passage through shear rolls and an aging period of several hours. In some plants the rolls precede the aging treatment, and in others the procedure is the reverse. The shear rolls are polished granite cylinders which, as their name implies, subject the semi-solid emulsion to a vigorous shearing action as it passes between them.

Blending Margarine

The final step is known as blending and is conducted in a closed apparatus resembling a kneading machine. A vacuum is produced while the product is masticated vigorously to remove entrained air and to improve the texture of the finished margarine. The water-soluble minor ingredients are added at this point, the oil-soluble constituents having been introduced previously in the churns. After blending, the margarine is extruded, cut into cakes, and packaged.

A few German firms produced the approximate equivalent of American vegetable shortening before the war by whipping air into coconut or palm-kernel oil. The operation was conducted at a temperature barely above the melting point of the fat in churns similar to those used in the manufacture of margarine, and the resulting emulsion was poured into molds which were further chilled in tunnel coolers while the contents solidified.

Reversion of Soybean Oil

An important objective of the investigation under discussion was to ascertain what German technologists know about the so-called "reversion" of soybean oil and what remedial measures, if any, had been applied commercially. Nearly all the leading refiners are familiar with "Umschlag," as the phenomenon is known in Germany, but they did not agree on the extent to which the problem had been overcome. Most of the highly qualified experts thought that it had been solved completely, but many held the opposite view. Unfortunately, it was impossible to check the authenticity of these claims because no soybean oil was available anywhere in Germany.

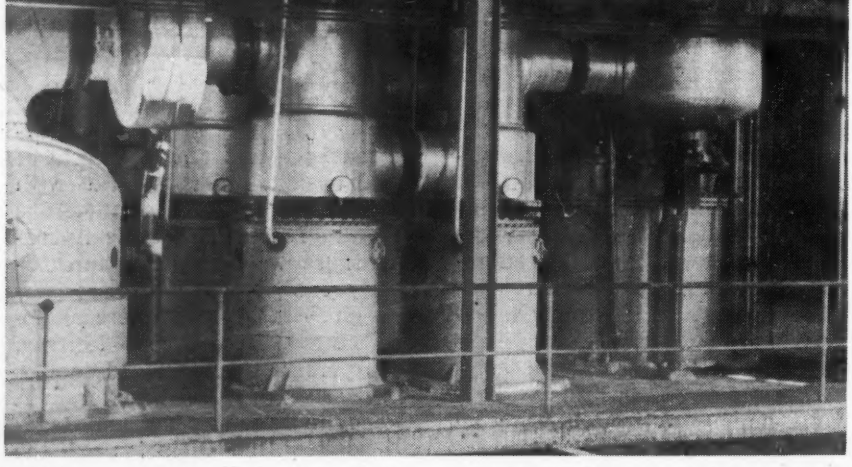
Lecithin and Reversion

Most of those who claimed success at minimizing reversion attributed the organoleptic behavior of soybean oil to lecithin, and two commercial methods based upon removal of this material were discovered. One of these was used widely and is said to have been developed in the 1920's. It consists in removal of the oil from sound beans by means of solvent extraction, at temperatures not exceeding 100 deg. C. in any step of the process, and then thoroughly washing out all the lecithin by two or three treatments with hot water in the manner previously described.

According to one refiner, the use of an expeller would nullify the effectiveness of the method because the heat developed in parts of the barrel of the machine would "set" the lecithin and render impossible the complete removal of the objectionable substances. Extreme care is necessary, according to the same authority, to avoid burning the oil during evaporation of the solvent from the miscella. For example, any steam-heated surface that is not continually covered with boiling or rapidly circulating liquid will become covered with baked solids and cause "setting" of some of the lecithin.

It was also claimed that contact with alkali would similarly make it impossible to eliminate all the phosphatides. If the preliminary separation of lecithin is sufficiently thorough, it is claimed further that any remaining traces can be inactivated by adding 0.01 percent of citric acid during deodorization. This is introduced as an aqueous solution containing 20 percent of the acid, and its use in any step other than deodorization is said to be futile.

The applicability of the preceding method to soybean oil produced in this country in the past probably would have produced results of doubtful significance, for most American soybean oil is obtained by expeller pressing. Moreover, at least a part of that recovered by solvent extraction is processed in equipment which does not meet the requirements specified by the German technologists. Even that small proportion of domestic extracted soybean oil that is degummed by washing with water is subjected to washing treatment only once instead of twice. For these reasons, the Northern Regional Research Laboratory has undertaken an exhaustive study of the preceding technic, the preliminary results of which have been reported elsewhere.[1] Additional tests are in progress, and the results will be made



Condensers employed in the distillation of synthetic fatty acids. Resulting acids are then usually fractionated to separate the portions containing the C_9 to C_{21} chains.

available as soon as the experiments have been completed.

Treatment With Live Steam

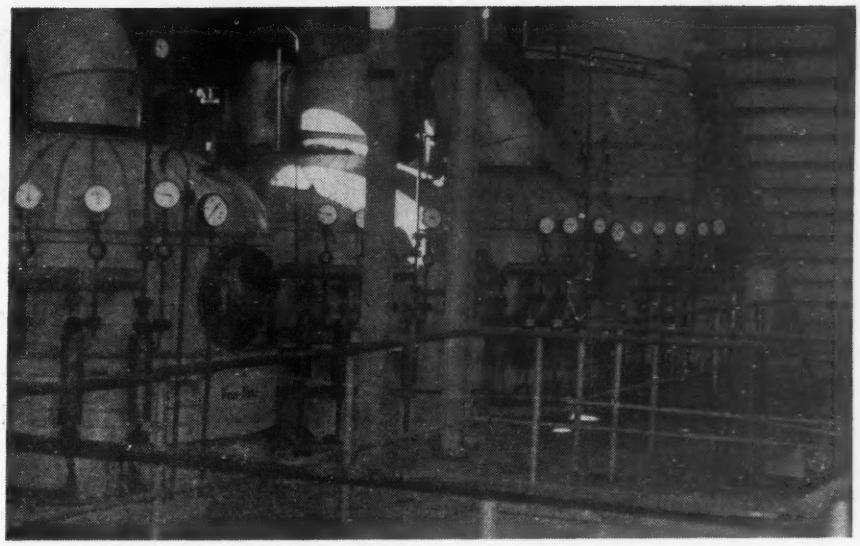
Another method of eliminating "Umschlag," one for which great virtue was claimed, consisted first in subjecting the whole soybeans to an extremely vigorous treatment with live steam. So violent is the exposure, in fact, that their temperature is raised to 100 deg. C. and the moisture content increased by four percent in 90 seconds. If it takes as long as 120 seconds to accomplish these changes, later steps in the process are said to be ineffective. The beans are then dried to remove the excess moisture and are extracted with a solvent in the usual manner. Only one washing is employed for abstracting the lecithin, and the crude oil is then heated from about 80 deg. to 240 deg. C. in 90 minutes. It is then cooled, neutralized, and otherwise processed in the same manner as other oils. The heat treatment greatly reduces the color of the oil so that less earth is necessary in the subsequent bleaching operation. Oils treated in accordance with this process are alleged to be free of reversion for periods of a year or more under ordinary conditions of storage.

Fatty Ethyl Esters

The scarcity of all fats, particularly those suitable for margarine, led the Germans to adopt numerous unusual practices for extending available supplies. Hazelnuts were processed for oil in appreciable quantities, and to a less extent oil was obtained from walnuts, corn germs, wheat germs, and rye germs. The recovery of offal fats from butcher shops, slaughter houses, restaurants, and various processing plants was also emphasized.

One of the more interesting wartime innovations was the inclusion of 5 to 10 percent of fatty ethyl esters in margarine. These were made by direct esterification, with ethanol, of distilled acids obtained from various inedible fats. It was found that the fruity aroma normally associated with ethyl esters can be eliminated by removing short-chain constituents. This was accomplished by mixing the monoesters with an equal volume of oil, neutralizing the free acids, and deodorizing until five percent of the esters had been steam-distilled.

Considerable publicity has been accorded the role which synthetic fats played in feeding Germany during the war, but the stories have been exaggerated in many quarters. The basis of the process for making these fats is the Fischer-Tropsch synthesis, by means of which carbon monoxide and hydrogen react to produce straight-chain hydrocarbons. The paraffin fraction boiling between 320 deg. and 450 deg. C. is oxidized catalytically with air to produce fatty acids. These are separated from the unoxidized hydrocarbons and other products by converting the acids to soaps, which can be purified subsequently by dissolving them in water or by distillation. Both methods are used, and the pure soaps are acidulated. The resulting acids are fractionated, usually to separate the portions containing C_9 to C_{20} chains which are used in making soaps of high quality and, to a small extent, in the manufacture of edible fats.



Stills used for separating synthetic fatty acids according to molecular weight. The Fischer-Tropsch method of synthesis is used to produce straight-chain hydrocarbons.

Synthetic Fat Output

Only one plant made synthetic edible fats commercially, and its output is claimed to have averaged 150 to 200 metric tons of margarine per week. The acids were esterified with glycerine, and the resulting fat was used to manufacture margarine in the usual manner. A sample of the material, which was six months old, possessed a strong "burnt" flavor slightly reminiscent of fuel oil. In the United States its quality would be considered about on the border line between edible and inedible.

Conflicting statements have been obtained on the use of synthetic fats, but these reports generally indicate that the Nazi Government promoted the production of such fats and suppressed any research that revealed nutritional shortcomings of the products. Some enthusiasts claim that the synthetic fats can be produced at prices competitive with those of vegetable oils, but the most reliable information obtained indicated that the synthetic product would normally cost two to three times as much as natural fats.

Effect of War on Oil Industry

The destruction suffered by many of the German oil mills and refineries is beyond description. A few plants received only minor damage, but many of the larger ones are utterly destroyed. The more fortunate owners, whose plants were still operable at the time of this investigation, were finding it impossible to operate them because seed, fuel, transportation, and repair parts have become either scarce or unprocurable.

Military action created a shambles of Germany's oilseed industry, and many years will be required to rebuild it to a position of prominence in world trade. There is ample evidence, however, that it had fallen far behind technologically even before the war. In most cases, the equipment and methods used in the United States are superior and are a reflection of the immensely greater quantity and quality of chemical and engineering research conducted in this country.

Reference

1. H. J. Dutton, H. A. Moser, and J. C. Cowan, The Relationship of Phospholipids to Flavor Stability in Soybean Oil. I. Evaluation of German Water Washing and Citric Acid Treatments, Presented at 37th Annual Meeting of the American Oil Chemists' Society, New Orleans, Louisiana, May 22-24, 1946.

Testing Packaging Materials For Quick Frozen Oysters

Consider the "free flowing" qualities of products and degree of handling during packaging and freezing when selecting cartons. Overwrap cartons if used without sealed bags. Findings may be applied to precooked frozen food

By S. R. POTTINGER, ROSE G. KERR, and WILLIAM B. LANHAM, JR.
U. S. Fish and Wildlife Service, College Park, Maryland

CONSIDERABLE interest in freezing oysters was shown toward the end of the war. Numerous inquiries were received by the Fish and Wildlife Service on the proper method of packaging oysters to maintain quality over extended periods of storage and to withstand rough handling during distribution. To answer these inquiries, a series of studies on the packaging and storage of frozen oysters was begun at the Service's Technological Laboratory, in College Park, Maryland.

Although new packaging materials were developed during the war, they were not available except for projects dealing directly with the war effort. Since these storage tests were started near the end of the war, only the more conventional types of packages and packaging materials were available. The first group of tests was made with a number of these materials.

Packages included single and duplex cellophane bags, specially coated paper bags, bags of laminated cellophane and treated paper, cartons alone and with bags, overwraps, and tin cans. Freshly shucked eastern oysters *Ostrea virginica* were used. These were obtained directly from a commercial shucking house.

Sufficient packages were prepared to allow periodic examination of oysters over a 12 months' storage period. Packaged oysters were frozen at approximately −30 deg. F., and held in storage at 0 deg. F.

To follow changes likely to occur during storage, packages and contents were examined at regular intervals for one year. Moisture retention is of primary importance in maintaining the quality of any frozen food. Consequently, packages were weighed once a month. Materials were examined for indications of breaks or punctures, drying out, or extreme brittleness. Weighings were made in the cold storage room to eliminate errors due to temperature changes, and condensation of moisture on packages. Scales, graduated in units of one gram, were used so that small changes in weight could be detected.

Judging Quality of Oysters

Each type of package was removed from storage at designated intervals for examinations which included: (1) Appearance of frozen oysters with emphasis on the presence of "freezer burn" and (2) changes in quality likely to occur during storage. Oysters were defrosted and the quantity and pH of free liquor present were determined; general appearance of the oysters evaluated; and taste tests were undertaken to determine, on a numerical basis, appearance, flavor and texture.

To judge the quality of the frozen oysters used in these tests, a taste panel was selected consisting of five members of the laboratory staff who customarily include oysters in their diet and are familiar with the flavor of good oysters. In preparing the thawed oysters for the palatability tests, they were drained, dipped in beaten egg, rolled in fine bread crumbs, and fried in deep fat for one minute. Vegetable oil heated to 375 deg. F. was used. Several samples were fried simultaneously so as to minimize cooking variations, and were served hot. Samples, designated by letters, were judged by the panel for appearance, flavor and texture. Scoring was done on a numerical basis. A perfect score consisted of 3 for appearance, 4 for flavor and 3 for texture, making a total score of 10. Independent scores of the five judges were averaged to obtain the final score for each sample. Fresh oysters, obtained at a local market, were included in the palatability tests for comparative purposes.

No outstanding differences were apparent in the quality of the oysters packed in containers affording *good* moisture-vapor retention. The oysters packed in a waxed carton without overwrap or inner bag received a lower score, and also showed the greatest loss in weight during storage. Slight darkening of the oysters occurred in all types of packages tested.

Each month's palatability scores was averaged. A score of 9 was obtained for samples one and two months in storage. This value dropped to 8.9 for samples in storage three to six months. The score rose again on the seventh month to 9.1. From the seventh month until the end of 12 months, the average scores varied between 9.2 and 9.5. Since a score of 9 or over is considered "very good," it appears that the quality of the frozen oysters remained at a relatively high level after 12 months' storage.

Loss In Weight

Average loss in weight for most packages tested was quite small, amounting to only a few tenths of one percent. In some instances, losses did not occur. In a number of

instances considerable variations in weight losses were found between individual packages. This was particularly true with some of the packages containing heat-sealed cellophane bags and those with heat-sealed wax paper overwraps. The heat-seals appeared to be tight, but there was a possibility that a slight opening, not readily detectable, was present. On the other hand, considerable variation in moisture-vapor permeability of coated films and papers is not at all uncommon, due to irregularities in thickness of coating, small breaks, poor adhesion between the coating and base film, brittleness of the coating at low temperatures, pin holes, and crevices caused by creasing of the sheet. One or more of these factors could very easily account for variations in weight losses between individual packages, particularly over an extended period.

Overwraps

From a standpoint of moisture retention, little advantage was found in the use of an overwrap with the bag-in-box type of container. Weight losses were substantially the same with or without the overwrap. With other types of containers, however, such as telescopic and top opening cartons which are often used without a sealed inner bag, a high quality overwrap plays an important part in retaining moisture-vapor within the package. This was shown in the groups in which frozen oysters were packed and stored in telescopic style waxed frozen food cartons without inner liners or bags.

In one group, no overwrap was used for the cartons. Packages in another group were overwrapped with moisture-vapor-proof cellophane. A frozen food type waxed paper overwrap was used for the third lot.

After one month of storage, average loss in weight from the unwrapped lot was 0.4 percent. This loss steadily increased during storage until, at the end of 12 months, it amounted to 2.3 percent. The top surface of the oysters showed extreme "freezer burn," and was brown in color and unattractive in appearance. In contrast, packages with moisture-vapor-proof cellophane overwraps lost no weight during this same period, and the oysters showed no signs of desiccation. In the lot wrapped with the waxed paper, the weight loss was negligible during the first six months of storage. A rapid loss in weight then occurred and, at the end of 12 months, the average total weight loss amounted to 1.24 percent. Considerable "freezer burn" was apparent on the surface of the oysters at that time.

Single and Duplex Bags

Negligible differences in weight losses were found between waxed cartons embodying single cellophane bags and those containing duplex cellophane bags. While slight variations in weight losses occurred between individual packages containing single bags, weight losses in packages containing duplex bags did not take place. Small differences in weight losses found in these tests, however, would not warrant substituting duplex bags for single bags.

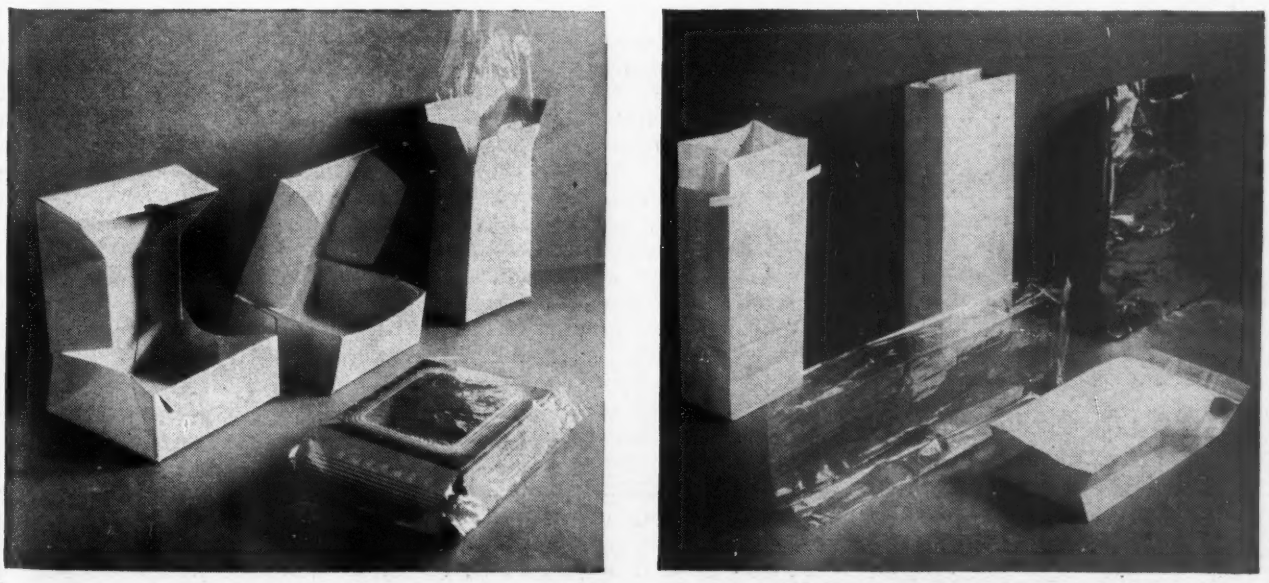
Heat-Sealable Coated Bags

A series of packs was made using a heat-sealable paper bag with a special coating or impregnation as a barrier against moisture-vapor transfer. The bag was inserted in a waxed paperboard carton. Considerable difficulty was experienced in sealing the bag, since the coating did not "set" rapidly after heat-sealing. Consequently the bag opened. This difficulty was overcome by holding the heated surfaces together with paper clips immediately after heat-sealing. The clips were removed after the heat-sealed area had sufficient time to cool. Small variations in moisture losses were found between bags. The average losses were negligible. These bags provided satisfactory protection for frozen oysters in storage.

No advantage was found in the use of bags made of laminated moisture-vapor-proof cellophane and wet-strength paper, since weight losses during storage were similar to those obtained with the use of nonlaminated cellophane bags. While it is true that greater strength is provided by the laminated material, it serves no useful purpose for a bag protected by a carton.

Metal Containers

Two types of tin cans, the friction (plug) top and the hermetically sealed, were tested. Pint size containers were used. Weight losses did not take place during storage, since the moisture-vapor transmission rate of a metal container is zero. Some difficulty was encountered, however, due to the expansion



Various types of bags and cartons used for frozen oysters. (Left): Plain cartons, carton with bag, and carton with cellophane overwrap. (Right): Single and duplex bags, specially coated bags, and bags with laminated cellophane and treated paper.

Thawed oysters are fried in deep fat in preparation for palatability tests.

of oysters during freezing. Although considerable head-space was left in the filled container to allow for this expansion, a cone shaped mound of oysters formed in the middle of the top surface. The friction tops were raised slightly by this cone in some instances, while the ends of the hermetically sealed cans were bulged outward. After a short period of storage, the air space around the cone in both types of cans was filled with ice crystals, and the surface of the oysters beneath these crystals was badly desiccated.

Freshness Important

The importance of freezing only strictly fresh food was shown by two series of packs included in these tests. Fresh oysters, taken from the same lot used for the other storage tests, were divided into two lots. Both lots were packed in friction top tin cans, and held in crushed ice. When the quality of the oysters was considered to be approaching the lower limit of freshness, yet saleable and edible, one lot was packaged in several of the bag-in-box type containers and frozen. The second lot was held in crushed ice until its quality was on the borderline between fresh and stale, yet edible. It was then packaged in the same type of containers and frozen. Both lots were then stored under identical conditions with the other packages.

After one month, the first lot had a stale odor when thawed, and was judged inedible by the taste panel. The second lot was found to be entirely spoiled. Remaining packages of both lots were left in storage, and the oysters became progressively worse.

Although these results cannot be considered as conclusive, they indicate to some extent that the degree of freshness of oysters before freezing can have a marked effect on the ultimate quality and storage life of the frozen product.

Requirements of the Package

Use of packaging materials with low moisture-vapor transmission rates for frozen foods must be emphasized. Sight is often lost of the fact that other factors must also be considered in planning a package. The package, when properly chosen, must perform a number of functions. During storage and distribution, it must retard the development of rancidity and loss of certain nutrients due to oxidative changes caused by free access of air. It must provide structural support necessary during filling and freezing. It must prevent physical damage to the contents in the normal course of handling during storage and distribution. Merchandising appeal, quite important to consumer acceptance and success of the product, is enhanced by a properly designed and attractive package.

All paperboard for use in the fabrication of frozen food containers should be waxed or otherwise treated to prevent loss of rigidity which might occur through condensation of moisture on the surface or through contact with wet materials. Inner and outer surfaces of the container should have a clean, sanitary appearance.

In selecting a carton for frozen oysters, the "free-flowing" qualities of this product must be considered, together with the degree of handling which will be necessary during packaging and freezing. If oysters are packaged by hand, a watertight container, such as a sealed bag within a carton, would probably prove to be more satisfactory, since the package can be turned at any angle before freezing without danger of spillage.

Cartons which are used without sealed bags are quite generally overwrapped. When cartons are used for a "wet" product such as oysters, considerable difficulty would probably be encountered in applying an overwrap by hand. Therefore, such cartons lend themselves better to automatic machine wrapping. For either type of package, an overwrap provides added protection against normal wear and tear during distribution, and affords an excellent medium for attractive labeling.

Periodic weighings made of packages in a storage room to determine weight losses.

Preventing Freezer Burns

A factor often overlooked in frozen food packaging is the presence of air pockets and excessive air space within the package. Despite the use of properly sealed moisture-vapor-proof materials, localized freezer-burn occurs wherever voids are found between packaging material and the frozen product. For this reason, the package must be filled with a minimum of air pockets. Only sufficient head-space must be permitted for expansion of the frozen food during freezing.

Since the oysters remained in a satisfactory condition at 0 deg. F. over a period of 12 months, it appears that this storage temperature, so generally recommended for frozen foods, is suitable for holding frozen oysters.

A number of acceptable cartons for frozen oysters are available today. The choice must be determined by the requirements of each producer and whether oysters are packaged by hand or machine. Oysters, suitably packaged, frozen and stored can be available for consumption the year round.

Free Liquor

After oysters had been thawed in the package, they were removed, weighed, and allowed to drain on a wire screen for approximately two minutes. The liquor was collected and used for determination of pH. The remaining meats were weighed, and the quantity of free liquor was determined by difference. The average amount of free liquor, calculated as percent of the entire contents, was variable and showed no consistent trend. No significant dif-

(*Turn to page* 220)

Using Soybean Lecithin In The Macaroni Industry

PART II—Lecithin improves the quality of cooked macaroni products. Weight and volume increases take place. Sweating is inhibited, indicating possible benefits to the canned items. Vitamin B_1 retention is relatively unaffected

By J. J. WINSTON and B. R. JACOBS
National Macaroni Manufacturers Association, New York City

MACARONI products undergo many changes during cooking. The extent of these changes with plain and lecithinized macaroni is shown by studying: (1) Losses in water soluble vitamins, (2) dissolved solids in cooking water, (3) foaming, (4) consumer appeal, (5) synersis or "sweating" after storage, (6) weight and volume increases, and (7) the iodine number. The quality of macaroni products, from a standpoint of behavior during cooking, has been evaluated by LeClerc[1], Binnington, Johannson and Geddes[4], and Borasio[18].

Two samples of spaghetti were manufactured commercially under supervision and in each case, the same mixer, kneader, hydraulic press and drying room were used. The pressure necessary for the extrusion process was maintained at the same level (2500 lb. per sq. in.). One of the products constituted the control and the other contained 0.5 percent lecithin.

Cooking Properties

These products were cooked in accordance with the following standard procedure:

Drop 8 oz. of macaroni or spaghetti into two quarts of boiling tap water containing one percent salt. Boil briskly for 20 minutes, counting from the time the macaroni product is dropped into the water. Drain through colander or strainer.

Determining the weight and volume increases of cooked spaghetti. Increases are slightly greater with lecithinized spaghetti.

The above procedure has been accepted by the Food and Drug Administration for determining losses of water soluble vitamins in macaroni products. This procedure was adopted as a result of an investigation made into home methods of cooking macaroni products by the National Macaroni Manufacturers Association Laboratory and the Food and Drug Administration.

Cooked products were examined carefully, and the following determinations were made: (1) Percentage weight increase, (2) percentage volume increase, and (3) the percentage of residue (dissolved solids in cooking water) as recommended by the Association of Cereal Chemists[19]. Observations were also made during cooking to determine whether lecithin would have any effect on foaming.

Foaming

Froth or foam is the more or less stable extended air-liquid interface arising when bubbles persist at the surface of a liquid as a result of agitation, aeration, or ebullition[20, 21]. An enormous film surface of liquid is presented to the gas phase so that froth is primarily a labile system, owing to the tendency for the interface to be reduced to a minimum. No pure liquid will yield a froth. Gas bubbles are finely divided and suspended in the liquid. The liquid in which the gas bubbles are suspended is more often a colloidal system containing lyophilic colloids. Chief factors necessary to produce foams are a certain degree of viscosity of the liquid used and a low air-liquid surface tension. High viscosity alone is not sufficient, but it must be accompanied by a low sur-

TABLE V—Volume and Weight Increases, Percent Residue and Amount of Foam in Plain and Lecithinized Spaghetti During Cooking.

Product		Increase in volume, percent	Increase in weight, percent	Residue,* percent	Observations
Spaghetti (Control)	(1)	249.8	180.0	9.35	Excessive foam
	(2)	259.0	187.0	11.40	
	(3)	235.0	172.0	7.66	
Spaghetti (Yelkin BTS)	(1)	256.0	184.3	8.86	Moderate foam
	(2)	267.0	189.0	9.47	
	(3)	250.0	180.0	7.55	

(1) Average of eight cooking tests, (2) maximum and (3) minimum.

* Dissolved solids in cooked water indicates the degree of disintegration.

face tension. Dissolved substances, which decrease interfacial energy, tend to concentrate at the liquid-vapor interface and therefore will increase frothing.

Based on cooking tests, the quality of spaghetti products is slightly, but definitely improved when lecithin is used. The addition of 0.5 percent of lecithin will reduce the amount of disintegration by 0.49 percent and yield a product with a slightly greater increase in volume and weight. It was also observed that foam produced by lecithinized products was moderate in contrast to the excessive amount of foam produced by plain spaghetti. Therefore, less attention was required to cook lecithinized products. Foam reduction is due to the presence of lecithin which lowers the viscosity of the water and forms a ratio between viscosity and surface tension that is not conducive to foam formation.

Appeal to Consumers

Several cooking tests were conducted in the manufacturing plant to determine consumer appeal and acceptability according to the following characteristics: (1) Cooking, (2) appearance, (3) flavor and (4) texture.

Plain and lecithinized spaghetti were cooked at the same time, and served in dishes marked for identification. The same chef cooked the spaghetti. After five different tests, the lecithinized product was judged as acceptable as the plain product. More people favored lecithinized spaghetti due to a slight reduction in doughy taste and better eye appeal.

Syneresis or "Sweating"

It is a practice among restaurants to store cooked macaroni products in the refrigerator over-night and then serve them the following day. This practice is also followed by families who are in the habit of consuming large quantities of macaroni products. Consequently tests were conducted to determine the changes that would take place in appearance, color and palatability of plain and lecithinized products held over-night in a refrigerator.

Two samples of spaghetti were manufactured commercially, using the same mixer, kneader, hydraulic press and drying room. The first sample constituted the control and the second sample contained 0.5 percent of lecithin. The two samples were cooked in accordance with the standard procedure, advocated by the Food and Drug Administration and the laboratory of the National Macaroni Manufacturers Association.

Drained, cooked spaghetti samples were examined independently by three chemists. The cooked spaghetti was then divided into equal portions and covered with plates. One portion of each product was stored in the laboratory room (temperature 70 deg. F. and relative humidity 60 percent). The second portion was stored in a refrigerator (temperature 32 deg. F.). Samples were then examined independently 14 hours later.

The control sample appeared more moist and undesirable when stored at room temperature than at refrigerator temperature, and the lecithinized product at room temperature showed a slightly rough surface which was not evident in the refrigerated state. The experiment was repeated the following day, and the same results were obtained.

Control spaghetti showed evidence of syneresis or "sweating", as indicated by the extrusion of liquid on the surface. Lecithinized spaghetti, on the other hand, did not show this change to any appreciable degree.

Presence of lecithin in cooked macaroni products inhibits syneresis and impedes undesirable changes which take place during storage. It also maintains cooked products in a more appealing and appetizing state. This tendency on the part of lecithin to prolong the life of cooked products may be important in canned, cooked macaroni products. Generally, canned, cooked macaroni assumes a rough surface during storage.

TABLE VI—Properties of Cooked Spaghetti With and Without Lecithin Before and After Storage.

Property	Spaghetti (Control)			Spaghetti (Yelkin BTS)		
	Before storage	After storage (room temp.)	After storage (refrig.)	Before storage	After storage (room temp.)	After storage (refrig.)
Color	Pale yellow	Pale yellow	Pale yellow	Bright yellow	Bright yellow	Bright yellow
Texture	Slight roughness	Rough with wet surface	Rough with wet surface	Smooth and uniform	Slightly rough surface	Smooth with dry surface
Palatability (chewing characteristics)	Firm and palatable	Soggy; poor palatability	Soggy; poor palatability	Firm and palatable	Slightly soggy; little change in palatability	Firm; little change in palatability

TABLE VII—Vitamin B_1 Retention in Plain and Lecithinized Spaghetti After Cooking.

Product		Vitamin B_1 content, mg. per lb. Uncooked	Cooked	Retention, percent
Spaghetti (control)	Av. 8 tests	2.24	1.39	62.1
	Max.	2.24	1.51	67.4
	Min.	2.20	1.29	58.6
Spaghetti (Yelkin BTS)	Av. 8 tests	2.23	1.36	61.0
	Max.	2.30	1.46	63.5
	Min.	2.16	1.29	59.7

TABLE VIII—Iodine Number of Lecithin, Egg Yolk, Spaghetti and Noodles.

Product	Iodine number
Semi-liquid (Yelkin BTS)	98.2
Solid (Yelkin BTS)	88.4
Spaghetti (control)	71.4
Spaghetti (Yelkin BTS)	74.7
Spaghetti (control)	72.0
Spaghetti (Yelkin BTS)	74.0
Egg yolk powder	65.9
Egg yolk powder	67.0
Egg noodles (control)	67.6
Egg noodles (Yelkin BTS)	73.8
Egg noodles (control)	70.4
Egg noodles (Yelkin BTS)	69.1
Egg noodes (control)	68.0
Egg noodles (Yelkin BTS)	71.1

Vitamin B_1 Retention

Macaroni products are subject to vitamin losses as a result of leaching effects during boiling. The value of lecithin in the reduction of surface and interfacial tensions has been stressed[22], and its emulsifying properties recommended as an aid in stabilizing diverse food products[23]. It was believed appropriate to determine the effect of 0.5 percent of lecithin on the vitamin B_1 retention of macaroni products during cooking, since this represents the most soluble member of the vitamin B group used in the cereal enrichment program.

Samples of spaghetti were manufactured under supervision and

control. The required amount of vitamin B_1, in the form of thiamin, was incorporated into the lecithin which in turn was premixed with a given weight of flour to provide a vehicle for the uniform distribution of vitamin B_1 during manufacture. Eight samples were made with 0.5 percent lecithin and the necessary amount of vitamin B_1. Eight other samples were made with only the necessary amount of vitamin B_1 added. All sixteen samples were similarly processed and subjected to the same standard cooking procedure. The cooked spaghetti in each instance was introduced into a Waring Blender and thoroughly mixed with an equal weight of dilute sulphuric acid. Cooked and uncooked spaghetti were then assayed for vitamin B_1 by means of the thiochrome method[24]. Results were reported on a moisture-free basis. Cooked, control and lecithinized samples retained about the same amount of vitamin B_1, which corresponds to that normally retained.

Iodine Number

The iodine number of commercial soybean lecithin has been reputed to be much higher than that of egg lecithin. The possibility of differentiating egg from soybean lecithin was investigated by determining the iodine number of macaroni products with and without 0.5 percent soybean lecithin. A means for distinguishing egg from soybean lecithin, based on the abnormal fluorescence of soybean lecithin, has been suggested by Winston and Jacobs[25].

Products examined for iodine number were extracted for lipoids[26] and the absorption of iodine determined by using the Hanus method[27].

Although pure, commercial soybean lecithin has a higher iodine number than egg yolk, the addition of 0.5 percent of lecithin to either a macaroni or noodle product did not have any significant effect on the unsaturation value. Since the iodine number of any substance in general, has a certain range characteristic for that substance, the slight increase due to the addition of lecithin is not sufficient to warrant indication of the presence of added phosphatides. It should be pointed out, however, that a method for estimating the egg solids of macaroni and noodle products, based on the cholesterol content, has been very well presented and described by Haenni[28].

Experiments were undertaken to determine the effects of small quantities of commercial lecithin added to macaroni products during processing. Tests conducted on a commercial scale showed that:

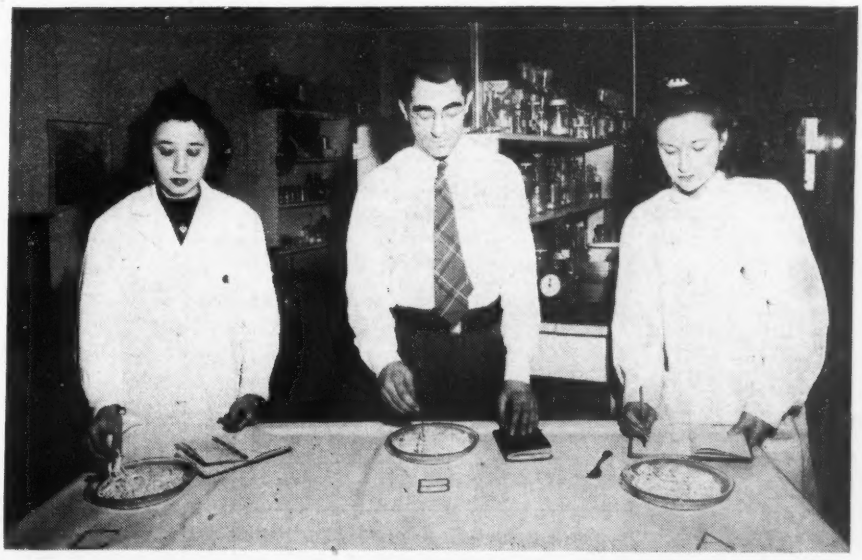
1. Lecithin can be added to macaroni products by means of a flour-lecithin premix, containing 25 percent of lecithin by weight.
2. Macaroni products, containing 0.5 percent lecithin, can be manufactured commercially without impairing processing efficiency.
3. The quality of macaroni products, as evaluated by its color index, is substantially improved because of the antioxidant property of lecithin. Oxidation of the carotenoid pigments is retarded, and a greater retention of the yellow color results. Macaroni products are made with a greater degree of translucency and, consequently, better visual color.
4. Greater contrast in color and appearance was noted between lecithinized spaghetti and the control containing the higher extraction flour than between lecithinized spaghetti and the control containing regular grade farinaceous ingredients.
5. Lecithin produces a slight reduction in mechanical strength of macaroni products, resulting in a slight decrease in breakage resistance during drying.
6. Cooked, lecithinized spaghetti products show larger volume and weight increases than plain spaghetti products. In addition, a reduction in total residue in cooked water indicates less distintegration.
7. The presence of 0.5 percent lecithin in spaghetti products inhibits syneresis or "sweating" during storage, pointing to its possible beneficial role in canned, cooked macaroni products.
8. The presence of lecithin in spaghetti products will not influence the retention of vitamin B_1 during cooking.
9. Iodine values of lecithinized products are slightly higher than plain spaghetti, but the differences are not significant.

Acknowledgment

The authors express their thanks to A. V. Vermylen, A. Zerega's Sons, Inc., Brooklyn, New York and Caruso Foods, Inc., Long Island City, New York for the use of their plant facilities; to J. Eichberg, American Lecithin Co., Inc., Elmhurst, New York for his many helpful suggestions; to the American Lecithin Co., Inc., for Yelkin BTS lecithin used in the experiments; and to Jeanne M. Bisogno and Sally Neuwirth, National Macaroni Manufacturers Association for technical assistance.

References

1. J. A. LeClerc, *Cereal Chemistry*, 10, 383-420, 1933.
4. D. S. Binnington, H. Johannson and W. F. Geddes, *Ibid.*, 16, 149-167, 1939.
18. L. Borasio, *Giornale di Risicoltura*, 25, 251-257, 1935.
19. Cereal Laboratory Methods, American Association of Cereal Chemists, 148-150, 1941.
20. R. A. Gortner, Outlines of Biochemistry, 1938.
21. M. B. Jacobs, Food and Food Products, vol. 1, 1945.
22. L. R. Cook, *Food Industries*, p. 74, July, 1945.
23. J. Stanley, *Ibid.*, July, 1942.
24. D. J. Hennessey, *Industrial and Engineering Chemistry*, 13, p. 216, 1941.
25. J. J. Winston and B. R. Jacobs, *Journal of Association of Official Agricultural Chemists*, 28, 607-616, 1945.
26. Methods of Analysis, Association of Official Agricultural Chemists, p. 219, 1940.
27. Ibid., p. 429, 1940.
28. E. O. Haenni, *Journal of Association of Official Agricultural Chemists*, 24, 119-147, 1941.



Evaluating the quality of cooked spaghetti. Acceptability is determined by color, flavor, texture, and behavior on cooking.

How Storage Affects Frozen Cakes and Batters

Frozen cakes had better volume and palatability than cakes made from frozen batters. Changes were detected in color, flavor and aroma after two months at 0 deg. F., not at —10 deg. F. Synthetic vanilla affected keeping quality

By LORA S. GRAUL and BELLE LOWE, Foods and Nutrition Dept.,
Iowa State College, Ames, Iowa

THE few published studies on frozen bakery goods indicate that any ingredient may cause difficulty in the keeping quality of the product. An ingredient causing difficulty, such as the synthetic vanilla flavoring used in this study, may comprise a very minor proportion of the total mix. Yet, inclusion of this ingredient may bring about an unpalatable, almost inedible cake after a period of storage of the frozen product.

Method

Two fats were used, a hydrogenated lard (Clix, Cudahy, Omaha, Neb.), typifying the type of fat commonly used for cakes by commercial bakers, and butter. Liquid milk, shell egg magma, a mixed sodium aluminum sulfate and calcium acid phosphate baking powder, and a cake flour were used. Mixing and storage were done in the latter part of 1945, before the era of the emergency flour. A common household formula for plain cake was used and the procedure of mixing ingredients, weighing, and baking were standardized.

Batters, representing eleven 240-gram portions, were obtained from each mix made with hydrogenated lard. One was baked and scored. Two were baked and frozen, one of which was scored after four months, and the other after eight months of storage. The remaining eight portions were frozen, then baked at intervals, two each at the end of two, four, six, and eight months. One of the batters was put in the oven while still frozen and the other reached 28 deg. F. prior to baking. Eight portions of batter were obtained from cakes made with butter, and no batters were baked after two and six months of storage.

There were 15 replications of each treatment for both butter and hydrogenated lard cakes. Twelve replications of each treatment for each fat were stored at —10 deg. F, three at 0 deg. F. In addition, there were four replications of each treatment of the mixes (with hydrogenated lard only) to which synthetic vanilla was added.

Small, slightly slant-sided baking pans (about 700 ml. capacity) were lined with a glycerinized

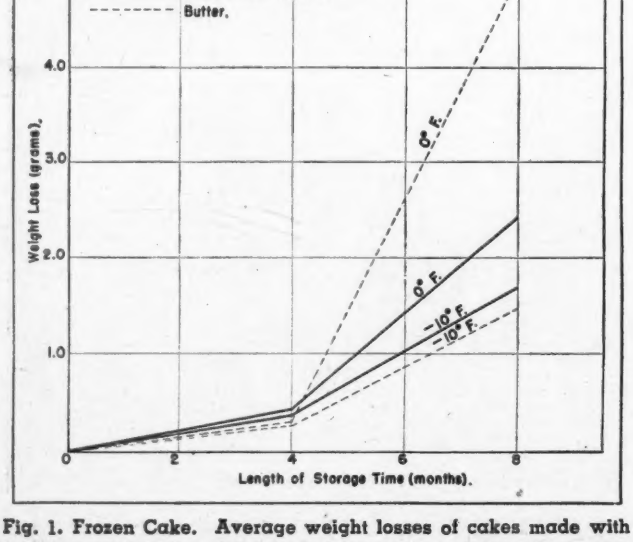


Fig. 1. Frozen Cake. Average weight losses of cakes made with hydrogenated lard and butter during 0 and —10 deg. F. storage.

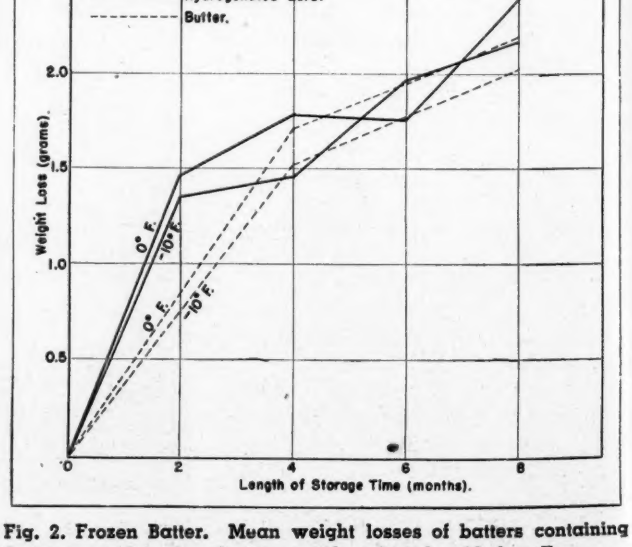


Fig. 2. Frozen Batter. Mean weight losses of batters containing hydrogenated lard or butter stored at 0 and —10 deg. F.

parchment paper (Patapar 27 lb.—400, code No. 27-2T, Patterson Parchment Co.). This paper functioned equally well at both high and low temperatures, and eliminated greasing the pans. Batters were frozen in the pans. The liner made it possible to lift the batters from the pans for packaging and to reinsert them into the pans for baking. To maintain a standard procedure, all cakes were baked with the liner. Freezing was done on a single refrigerated metal plate at —35 deg. F.

Cakes and frozen batters were wrapped in waxed paper and laminated cellophane (Sylphrap, Sylvania Industrial Corp.). A lock fold, sealed with Scotch tape, was used to make as air tight a closure as possible. Cakes were wrapped as soon as they were cool and then frozen. Frozen batters were wrapped in a room at 20 deg. F.

Since flavoring could mask any slight off-flavors likely to develop, flavoring was omitted from a majority of the cake mixes. To duplicate common practice, however, synthetic vanilla was added to several mixes. Frozen cakes and batters from these mixes were stored six months at 0 and —10 deg. F.

Weight Losses

Mean weight losses of the frozen cakes are shown in Fig. 1. Losses were negligible after two months of storage. After four months, weight losses were one-half gram or below, but increased more rapidly thereafter, reaching about 1.5 to 2.4 grams after eight months. Three butter cakes, stored eight months at 0 deg. F., showed weight losses of five grams. Mean weight losses of frozen cake batters were greater during the earlier months of storage than for the cakes, as shown in Fig. 2. After eight months, weight losses varied from 2 to 2.4 grams, about one percent.

Thawing Time

Batters, stored at —10 deg. F., reached 28 deg. F. in about 56 minutes, and were soft in consistency. An additional period of 25 minutes was required for the batter to pour. Batters stored at 0 deg. F. required five minutes less time. Frozen cakes could be cut and used upon removal from storage. It took five hours for the internal temperature of the cake to reach 75 deg. F., when held at 77 deg. F.

After six months, part of the batters had hard round dots on the surface. These were lighter in color than the remainder of the batter, and were similar to freezer burn in other products. After eight months, the entire surface was hard so that it was difficult to pierce the crust with a thermometer bulb (which could be done easily after two months) without splitting the frozen batter.

A noticeable difference in color of the batters or cakes made with hydrogenated lard developed at the higher temperature. After two months at 0 deg. F., the yellow color had deepened so that the color of the batter was approximately the same as the batters of mixes made with butter. This color did not change with longer storage, nor did it develop in cakes from the same mixes stored at —10 deg. F.

The addition of synthetic vanilla to four mixes changed the color from yellow to a grayish white, with a pink tinge. The surface of the batters were characterized by a pattern of lines similar to shattering or breaking.

Cake Volume

The deleterious effect of freezing on volume of cakes and batters is shown in Fig. 3. This decrease in volume was thought to be due to one or all of several factors. Some degree of "settling" may have occurred in both cakes and batters. Since they were stacked one upon the other in the storage compartment, some compression of the lower cakes and batters must have occurred. This would account for the decrease in volume during storage of the baked cakes, but not entirely for the volumes obtained with frozen batters. It is possible that dissipation of the leavening in batters took place, because of prolonged contact of baking powder with moisture. Possibility of some denaturation of proteins in the batters as a result of aging and freezing cannot be overlooked. Denaturation would decrease the extensibility, at least of some of the proteins, and bring about decreased volume in the cakes baked from batters which had been frozen. As denaturation would increase with longer storage, the effect on cake volume should be progressive with longer storage, as shown in Fig. 3.

Control cakes for the 0 deg. F. storage temperature and cakes from each mix which were baked immediately after mixing, had slightly larger average volumes (for both hydrogenated lard and butter) than controls for cakes stored at —10 deg. F. All cakes or cakes from batters stored at 0 deg. F., with one exception, had smaller mean volumes than cakes of similar treatment stored at —10 deg. F. As indicated after two months of storage, this decrease in volume was decisive. The one exception was for the group of hydrogenated lard cakes baked from frozen batters, held in storage for four months. The frozen batters could be held for a maximum of two months at —10 deg. F. without incurring significant damage upon cake volume.

After two months, cakes baked from frozen and thawed batters held at 0 deg. F., exhibited the same color changes as the batters. Likewise, cakes baked before storage were more yellow. Any additional color change was imperceptible between two and eight months. Cakes

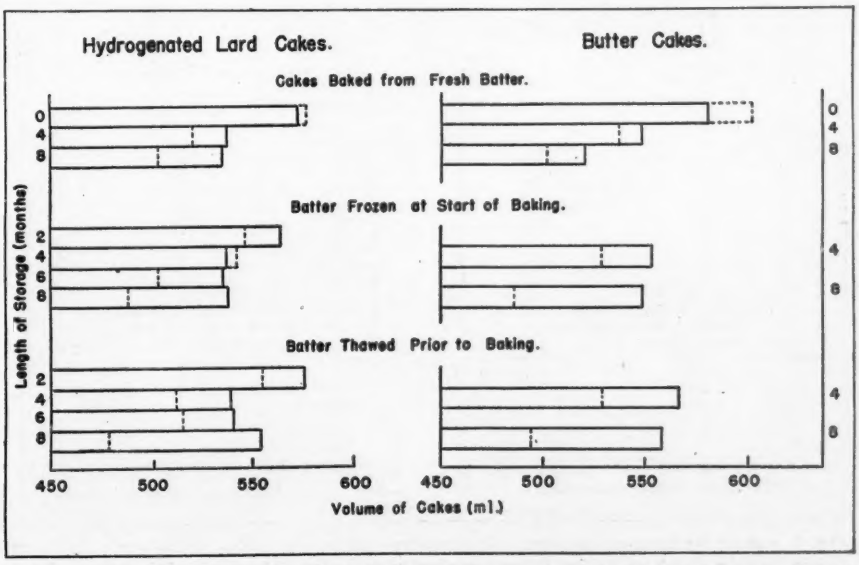


Fig. 3. Mean volumes of cakes baked from fresh, frozen and thawed batters. Dotted lines represent cakes stored at 0 deg. F. and solid lines those stored at —10 deg. F.

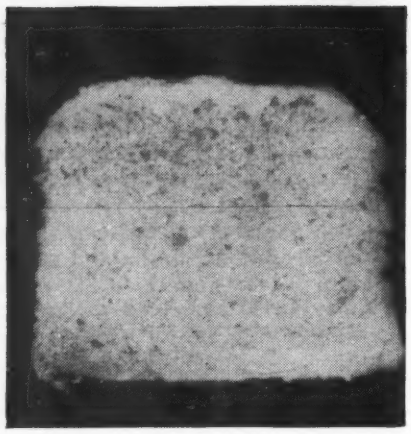


Fig. 4. Frozen Cake. Cake baked using hydrogenated lard, frozen, and then stored for a period of eight months at —10 deg. F.

baked from stored batters, however, were yellower than cakes from the same mixes stored at —10 deg. F. after eight months. External appearance of the cakes was relatively the same as those held at —10 deg. F.

As the frozen and thawed batters baked, they had a tendency to fold toward the center. After baking, a distinct longitudinal crease appeared through the center of the crusts. The crease was more marked in cakes baked from frozen batters than in those baked from thawed batters. With prolonged storage, the top crusts became more and more smooth.

A lack of crispness and a moist, shiny appearance characterized the frozen cakes after they had thawed, as shown in Fig. 4. As the length of storage was increased, cakes baked from frozen or thawed batters showed greater shrinkage from the sides of the pan during cooling. Fig. 5 shows the extent of side shrinkage.

Internally, fresh cakes baked from batters after mixing, had a fairly compact, fine grain and even texture. After two months at —10 deg. F., cakes baked from frozen and thawed batters were similar to fresh cakes. With longer storage, the cakes became more compact, with an increasingly heavy layer at the bottom of the cake. (Fig. 5).

With the exception of the gummy nature of the top crust, seen in Fig. 4, cakes baked before freezing were similar in appearance to fresh cakes, even after eight months' storage.

Occasionally, after eight months' storage, tunnels of approximately 0.1 cm. in diameter formed in the cake and broke through the top crust. This occurred in cakes baked from batters either frozen or thawed when placed in the oven.

Palatability

The analysis of scores showed no significant differences among fresh cakes and frozen baked cakes or cakes baked from batters stored at —10 deg. F. Little off-flavor was noticed, regardless of the length of storage. Chief complaint of the scorers was the increased compactness of the cakes and the cakes from batters stored a longer time. The story was different with cakes and cakes from batters stored at 0 deg. F. A change in flavor accompanied the change in color. This off-flavor was more evident after four months, as shown in Fig. 6. This color change occurred in hydrogenated lard cakes, not in butter cakes.

Cakes and cakes baked from batters stored six months with added synthetic vanilla were unpalatable. The flavor was rather acrid, rancid and strong. They could be readily distinguished from other cakes in a blindfold test by their off-odor. Since vanillin, a component of synthetic vanilla, has an aldehyde group, this off-color and off-flavor may have been caused, in part, by an amino-aldehyde reaction.

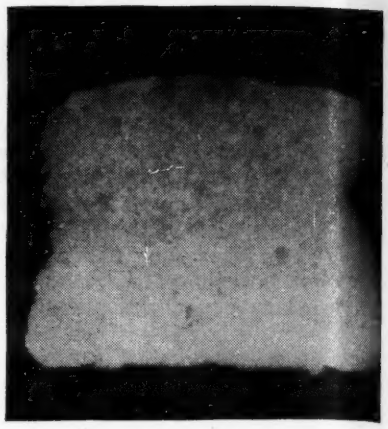


Fig. 5. Frozen Batter. Cake from thawed batter held eight months at —10 deg. F. Hydrogenated lard used in the batter.

Summary

Outstanding points in this study were:

1. The deleterious effect of freezing, with storage for longer than two months, on the volumes of both frozen cakes and cakes baked from frozen batters. In general, this effect was progressive with longer storage.

2. The decided effect storage temperature had upon cakes and cakes from frozen batters was unexpected. The difference in color, aroma, and flavor were noticeable after two months of storage at 0 deg. F., whereas other cakes from the same mixes stored at —10 deg. F. did not show these characteristic changes. Although the color did not change perceptibly after two months of storage, the aroma and flavor did deteriorate with longer storage.

3. The effect of the addition of synthetic vanilla to the mixes in producing unpalatable cakes with storage at both 0 deg. F. and —10 deg. F. was rather startling and spectacular.

4. Frozen cakes had better volumes and received higher palatability ratings than cakes baked from frozen batters obtained from the same mixes.

5. There are still many unsolved problems concerning frozen cakes and cake batters.

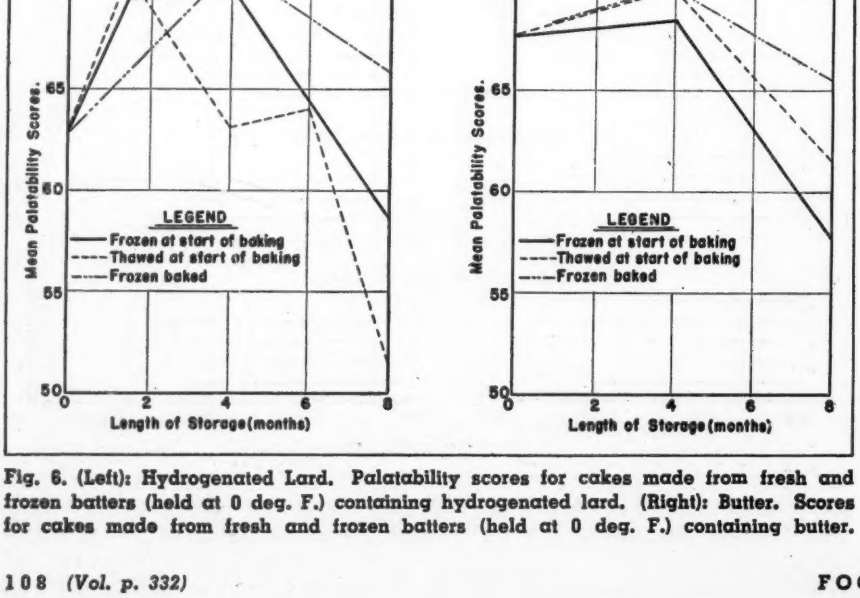


Fig. 6. (Left): Hydrogenated Lard. Palatability scores for cakes made from fresh and frozen batters (held at 0 deg. F.) containing hydrogenated lard. (Right): Butter. Scores for cakes made from fresh and frozen batters (held at 0 deg. F.) containing butter.

What's Ahead in Milk Processing

PART I—Present and potential milk supplies challenge technologists and management to stabilize, revive and expand prewar markets. Old products must be improved, new ones developed and standards of quality raised

By M. E. PARKER, Counselor in Food Production Development, and
E. S. STATELER, Associate Editor, "Food Industries", Chicago

PRESENT trends in production, market reactions and technological developments clearly indicate an approaching over-supply of milk for manufacturing uses. As recently as a year ago, most discussions on trends in milk processing, as emphasized by post-war developments, indicated a general attitude of complacency. Market demands for dairy products were greater than the supply; both actual and potential. Only a few leaders in the industry appeared to be giving any serious thought to a probable period of over-supply and to the beneficial effects of having production practices based on technological developments. The general trend of thinking appeared to be that reconversion in food processing to a peacetime basis was not as full of problems and opportunities as it was in many other industries; particularly those in which war munitions played a dominant role.

The year 1946 saw the end of the Office of Price Administration, also set-asides and limitation orders, with the result that new trends into the peacetime future of the dairy industry began to indicate definite patterns for the years ahead. Forward-looking milk processors began their programs of converting wartime milk production into peacetime products for domestic markets. These trends have been characterized during recent months by a downward movement of all markets for dairy products; incidentally, a movement that probably will not reach its low point until the flush production months of May and June.

The lifting of meat rationing adversely affected the consumption of cheese. It has been accompanied by declining cheese prices and a diversion of milk to butter making. This diversion, plus the churning of frozen cream for butter, has been coupled with an increased milk flow as a result of mild winter weather. All of these factors have contributed to a rapid increase in the production of high grade butter; also, to rapid declines in the price of 92-score butter on the major markets; in Chicago from a high of 89 cents a pound to its recent quotation in the vicinity of 60 cents. Some brokers predict further price declines with the expectation that butter will probably retail at a price somewhere between 60 and 65 cents a pound in June if present production trends continue.

Wave of Pessimism

To dairymen, these movements are preliminary to the development of a buyers' market. Evidence is found in that: (1) Fluid milk markets are weakening due to some slackening of demand as well as to increased milk flows; (2) buyers are refusing to pay high prices for bulk sweetened condensed milk, a move which already has begun to force prices downward; and (3) the D.P.M.A. reports that the government is curtailing purchases of evaporated, condensed and dried whole milk—none was purchased in January. These three factors have tended to create a definite wave of pessimism.

The present pessimism, however, should not blind the milk processor to the fact that domestic markets are basically stronger than the trade, itself, appears to believe. This conclusion becomes apparent if we pause to take stock of certain facts. The highest per capita consumption of total dairy products, in

Photo Courtesy of Bowman Dairy Company, Chicago

To insure maintenance of quality in raw milk each can is checked when received.

pounds of milk equivalents, since 1924 was reached in 1942 when it amounted to 839 lb. In that year 876 lb. of milk equivalents per capita were produced, compared to 867 lb. in 1945. On this basis, our present production of milk, outside that fed to calves, would be more than ample to satisfy the maximum domestic consumption of milk and milk products reached since 1924, if kept at home. Since shipments abroad will, no doubt, be diminishing markedly from now on, it would seem that the present scarcity of dairy products may soon disappear.

Rise in Milk Consumption

On the other hand, market milk and cream consumption has markedly increased—even since 1942. This increase was due to a considerable extent to the scarcity of butter, cheese and ice cream. Nevertheless, let us assume that we can maintain the maximum consumption of milk attained in 1945, which should be possible. (See Table I) Many in the armed forces and in war work learned to drink and like much more milk than they ever had used before. Let us also assume that we can return to the maximum consumption of cheese and ice cream reached in 1942, of evaporated milk in 1940, of condensed milk in 1925 and powdered whole milk in 1943, and, in addition, bring per capita butter consumption back to the 18.5 lb. reached in 1926. We would then need a total per capita production of 975 lb. of milk or an increase in milk production of about 12.5 percent. Instead of the 125,000,000,000 lb. of milk produced in 1945 we would need 140,600,000,000 lb. Even these amounts may be too low because the potential demand for dairy products in this country is still unmeasured. Consumption of dairy products is expected to rise to new peaks if quality is given primary consideration, if up-to-date protective packaging is practiced, and if the newer knowledge concerning the nutritive value of dairy products is effectively applied through education and proper advertising.

A total of 120,000,000,000 lb. in 1947 is the goal of the U. S. A. milk producers. In spite of a 2-percent drop in production of milk in 1946, as compared with 1945, milk production per cow in 1946 surpassed all previous records. On January 1, 1947 the daily output of milk per cow was reported to be 13.47 lb. compared with 12.60 on January 1, 1946. On January 1, 1947, 65.2 percent of the cows on farms were being milked compared with 63 percent twelve months previously. Recent heavy culling gives farmers fewer milk cows at the beginning of 1947 than in 1946 but the record production per cow tends to offset the drop of more than 4 percent in milk cow numbers during the year. With improved feeding methods, better breeding and superior management, it is probable that the production per cow in 1947 may be increased still further. The 1946 preliminary estimates of 119,882,000,000 lb. of milk production for 1947 may, therefore, be surpassed, with the attainment of the goal of 120,000,000,000 lb., although the unfavorable meat-dairy ratio and the unfavorable labor situation on farms, as well as any unfavorable weather, can upset any bullish predictions.

TABLE I—Recent Trends in Utilization of Milk*

	1944		1945		1946	
	Million lb.	Percent	Million lb.	Percent	Million lb.	Percent
Total milk production	121,381	100.0	125,045	100.0	122,708	100.0
Milk and cream for bottling	44,426	36.5	46,726	37.4	48,128	39.2
Total milk for manufacturing	55,752	45.9	54,985	44.0	52,800	43.1
For farm and other uses	21,203	17.5	23,334	18.7	21,780	17.6

* Based on B. A. E. statistics; 1946 estimated.

TABLE II—How Milk for Manufacturing Has Been Used

	* 1935–1939		* 1944		∮ 1945		@ 1946	
	Million lb.	Percent	Million lb.	Percent	Million lb.	Percent	Million lb.	Percent
Total supply of milk for manufacturing	49,815	100.0	55,752	100.0	54,985	100.0	52,880	100.0
For butter making	33,829	67.9	29,900	53.6	27,419	50.0	23,306	44.0
For cheese making	6,701	13.4	10,100	18.1	11,113	20.2	10,700	20.2
For evaporated and condensed milk	4,404	8.8	7,780	14.0	8,124	14.8	6,580	12.4
For ice cream	3,082	6.2	4,900	8.8	4,922	8.9	7,600	14.4
For bulk condensed milk	396	0.8	415	0.7	809	1.4	655	1.2
For dry whole milk	197	0.4	1,465	2.6	1,653	3.1	1,340	2.5
For all other uses	1,206	2.4	1,192	2.1	945	1.7	2,699	5.1

* D. P. M. A. News June 1945 p. 9 based on B. A. E. statistics.
∮ Based on B. A. E. statistics.
@ Estimated by B. A. E.

All these trends in markets and production definitely indicate that the industry must begin a thorough evaluation of its methods of distribution, processing and marketing. There is a real urgency to make the most of the newest technological developments. These developments have to do with character and location of processing plants, product quality, production economics and product diversification.

Production Up

The urgency is readily recognized when the magnitude of the problems ahead are evaluated. Under the stimulus of wartime demands, national production of milk was increased some 16,000,000,000 to 20,000,000,000 lb. over peacetime usage. Domestic markets on liquid milk and milk products have been so disturbed and even disrupted by politico-economic pressures, disguised as wartime necessities, that technology at its best, rather than merely smart merchandising, is and will be needed to stabilize, revive and expand markets to absorb this expected increased quantity of milk. Development of marketable products or creation of new markets to absorb the potential economic threat of the additional 16,000,000,000 to 20,000,000,000 lb. of milk requires considerably more than a complacent attitude on the part of any and all engaged in milk processing.

A pertinent factor in the feasible solution of these perplexing reallocation problems is the character and geographic location of milk handling and processing plants of the postwar era. In evaluating this factor of the dairy plant of the future, thought must be given to the two major functional aspects of milk plants: (1) The manufacturing plant; and (2) the combination processing-distributing plant.

Plant Location

The manufacturing plant involves choice of location, construction and equipment for the making of butter, milk powder, ice cream powders, cheese, dried whey, lactose, condensed and evaporated milks or any combination of these products that may be supplied to some other plant or central organization for distribution and marketing.

By way of contrast, the processing-distributing plant activity is more likely to center around the receiving, processing, packaging and marketing of products needing re-

frigeration, such as liquid milks, cream, butter, milk beverages, ice cream and similar perishables.

Regardless of the functional aspect of the dairy plant under consideration and its production practices, consideration must be given to the present and possible future markets for its products. Since diversification is the order of the day in almost every type of business, present plant facilities and their possible expansion should be thoroughly taken into account before any attempt is made to evaluate the directions of natural diversification. Even before these factors are studied and appraised, we must evaluate peacetime requirements for the finished products to be produced as well as estimate the present and future prospects for supplies and types of raw materials to be processed. Their availability is a factor of prime importance. For that reason, some fundamentals should be reviewed even though such a review may seem like reciting the elements of a primer.

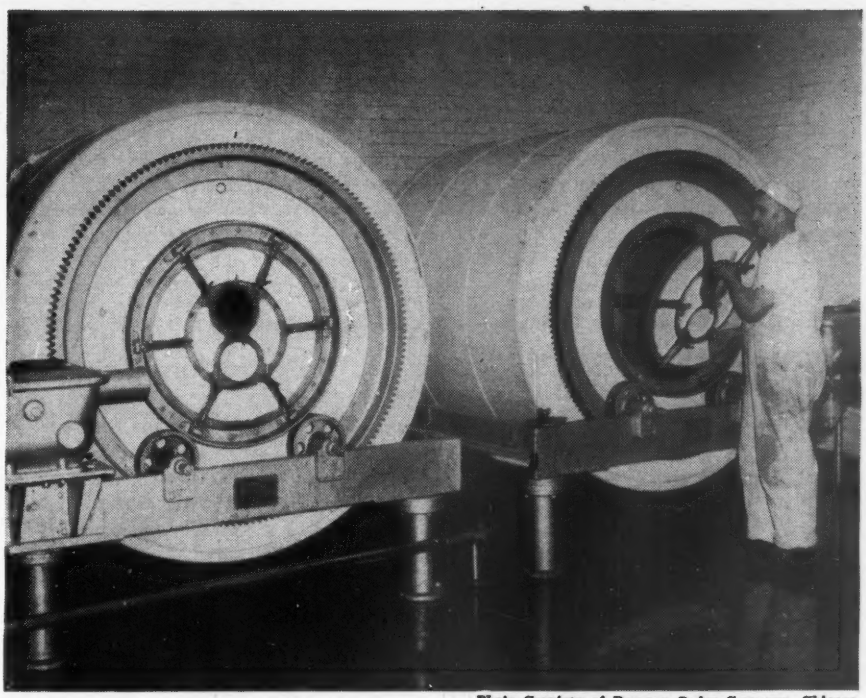


Photo Courtesy of Bowman Dairy Company, Chicago

There has been a rapid increase in production of 92-score butter.

Competition

Foremost is the premise that high quality will be a prerequisite for any food product that is to enjoy a peacetime demand. To proceed on any other basis will be sheer folly. If no other incentive be present, competition certainly will provide it. Obviously, the war-time sellers' market is being replaced by a peace-time buyers' market. However, any assumption that competition alone will provide the incentive is ridiculous. Powerful and primitive though the influence of competition can be, all food processing may expect to come under the increasing scrutiny of public health regulatory officials abetted by politico-economic pressures. Just as most business concerns are still pressing for release from the post-war shortages of essential manpower, materials and equipment, so, too, are the regulatory agencies preparing to flood the country with inspectors, field test requirements and sampling facilities. Many a tough "top-sergeant" type of individual is now enforcing objective quality control regulations and will continue to do so. These regulations may or may not conform to what the processor or consumer has in mind when he thinks of quality control. Be that as it may, the regulatory agencies will follow their own concept of the regulations.

To the consuming public, quality of a food product is most likely to mean price, appearance and taste. Flavor is vital. In addition, quality has come also to mean convenience in handling and preparing for use on the dining table. The American housewife has rebelled persistently and successfully against arduous and time-consuming formulation in her cookery with the result that, while flavor is still a compelling factor in acceptance, convenience has become more and more important. But, wherever academic discussion of "quality" may take us, as processors, we come to the realization that the quality of a food product is essentially a natural characteristic rather than an acquired one. In other words, quality cannot be put into a food product unless it is present in the raw material from which the finished product is produced. The present plight of frozen food processors and distributors with their top-heavy inventories begging for markets gives stark testimony of the ruinous effects of poor quality.

On this basis of what constitutes a sound and accurate understanding of "quality," we may proceed to a consideration of the raw materials themselves. Basically, any agricultural commodity, including foodstuffs, appears to have "quality" almost in direct ratio to its yield per acre. Indirectly, inherent quality in dairy products is dependent upon agricultural crops. From them, the dairy cow obtains the basic raw materials which she converts into milk to be marketed as such, or to be processed into dairy products.

Soil Depletion

In this respect, we must begin to realize that we can take out of the soil in milk or milk-product quality only that which the soil is capable of yielding. We must realize, also, that that which is taken out must be replaced eventually or the soil becomes depleted and the milk quality decreases. Results of the national survey on the vitamin-A content of butter give support to that statement.

To that extent, the work of the agronomist has a positive relation to food, even to milk, quality. Vegetable and fruit canners can bear witness to the importance of that relationship.

When evaluated on the basis of its various aspects, quality becomes the master key in the solution of the peacetime allocation of milk to production of end products. Not only must quality be attained and maintained in the basic raw material, milk. Its control during processing must be assured.

The dairy industry has developed an increasing consciousness of basic quality factors during the past 10 to 15 years. However, if the markets for dairy products are to be expanded to utilize the heavy milk production in conformity with sound nutrition and optimum pub-

(*Turn to page* 218)

Potato Chips Travel By Truck

The product's lightness presents unusual problems, among which is that of truck body design. Bulkiness of chips limits profitable radius of delivery from warehouses

POTATO chips, because of their extremely light weight, approximately 3 lb. per cu.ft. packed, present an unusual automotive distribution problem. With sugar weighing 43.5 lb. per cu.ft., and packed canned goods, such as tomatoes, corn and peas, weighing 45.6 lb. per cu.ft., it is evident that there can be no direct comparison between the wholesale and retail delivery cost per 100 lb., or ton of groceries and that of potato chips, since the latter would be abnormally high.

Yet the same factors that control the profitable sale and delivery of retail groceries also apply to potato chips. These include the area of delivery, the frequency of delivery, the size of the vehicle required, and the weight and selling price of the average store delivery.

One large wholesale grocer has determined, from long experience, that the cost of delivery should not exceed 2½ percent of the selling price of the goods delivered, if it is to earn a profit. While the selling price of groceries, except teas and coffees, is low, the selling price per pound of potato chips is extremely high. This makes possible the profitable automotive distribution of potato chips within reasonable limits.

Wide Distribution

This has been the experience of the Schuler Potato Chip Co. which has two large modern plants in Rochester, N. Y., and sells potato chips, pretzels and cheese and butter sticks throughout New York State, all the New England area and parts of Pennsylvania.

The raw products for this line are raised on Schuler owned farms, which are supervised by trained plant pathologists. The farms produce 325,000 bu. of potatoes annually in addition to 40,000 bu. of certified seed potatoes for independent farmers, who help increase the Schuler potato production.

This White cab-over-engine model is one of three trucks used by the Schuler company to ship their potato chips to warehouses within a 100 mile radius of the production plants.

Andrew S. Schuler, president of the company, began making pretzels in 1909 and used his father's horse and wagon as a one-horse-power distribution system. Today the company, specializing in potato chips, operates a fleet of over 100 trucks. Some of these are heavy trucks used for farm work and the balance for distribution and retail delivery. The company maintains distributing warehouses in Syracuse, Schenectady and Buffalo, N. Y.; Hartford and New Haven, Conn.; Providence, R. I.; Boston and Brockton, Mass.; Portland, Maine, and Manchester, N. H.

Delivery Pattern

The scheme of distribution is to ship the potato chips and allied products from the company's manufacturing plants to the various distribution warehouses by railroad, except when the warehouses are within 100 miles of the manufacturing plants. For such nearby warehouses, the company employs three long-wheelbase White van type trucks, as well as a tractor-trailer unit with a trailer body 30 ft. long.

From the various distribution warehouses, the maximum profitable radius of retail delivery is 30 miles. For this work, with the deliveries made to chain stores, independent grocers, taverns and hotels, approximately 80 percent of the company's fleet is made up of 1½-ton trucks and the balance of ¾-ton trucks used for close-in large city deliveries.

The basic truck in the retail delivery fleet is the 1½-ton International with a long wheelbase. The basic body is a custom-built model 6 ft. 6 in. high; 7 ft. 6 in. wide and 15 ft. long, all inside measurements. Such a body has a cubic foot capacity of 731.25 cu.ft.

Other Models

The company also owns other makes and models of trucks including the International step-in drive truck with the Metro body, made by the Metropolitan Body Co., Bridgeport, Conn. This unit, with a body capacity of 280 cu.ft. on a wheelbase of only 113 in., is the type now almost universally used by department stores for package deliveries. Its stand-up drive and step-in features enable the driver to speed up deliveries. In the Metro body the engine is located inside the body at the front, instead of outside under a hood. This provides a relatively large body cubical capac-

ity on a short 113-in. wheelbase chassis.

The company's retail deliveries are made on regular established routes with the trucks driven by uniformed driver salesmen. In most cases, they operate on the peddle system, that is, take out a full load of products, to be sold along their route. Besides making actual deliveries, the drivers handle store advertising displays. These they deliver to the customer and sometimes help him to set up as a means of promoting the sale of the company's products.

Frequency of delivery depends somewhat on the character of the territory served and the rate of consumption by the route customers through final sale to the consumer.

The Schuler company began operations in 1909 with this 1 h. p. model. Today the company operates a fleet of more than 100 modern trucks in distributing its products.

Maintains Quality

Potato chips are a perishable product subject to staleness and rancidity. Although the Schuler company packs its potato chips in Riegel printed double-wall Diafane bags, as the best method to prevent rancidity and staleness, it prefers to make retail deliveries daily or weekly rather than once every two weeks or once a month. It is much easier for the Schuler company to maintain its high quality standards in stock in its own air-conditioned warehouses than in the retail store outlets. As a result, it prefers a delivery frequency of not over a week and routes its trucks to serve its customers accordingly.

One of the typical Schuler shipping containers is a carton 23x12x $19\frac{7}{8}$ in. which has a gross weight of 9 lb. and contains 48 bags of potato chips with a net weight of 4.5 lb. The cubic capacity of the carton is thus 3.19 cu.ft. The packed weight is 2.8, approximately or 3 lb. per cu.ft.

Compared with potato chips, a 100 lb. bag of sugar occupies space approximately 2.3 cu.ft. and thus weighs 43.5 lb. per cu.ft. A case of 24 No. 2 cans of tomatoes weighs 36.5 lb. and occupies approximately 0.8 cu.ft. space and thus weighs 45.6 lb. per cu.ft.

From the standpoint of value, if the 48 bags in the 9 lb. carton of potato chips sold at 10 cents each, the value of the carton would be $4.80 or at the rate of 53 cents per lb. compared with sugar at 8.1 cents per lb. and the tomatoes at 8.8 cents per lb. on a case selling price of $3.12.

However, since the carrying capacity of a truck is determined by the cubical capacity of its body, the above ratios, when converted to value of the product per cu.ft. of body capacity, show the sugar load to be worth $8.10 divided by 2.3 cu. ft. or $3.52; the tomatoes at $3.12 divided by 0.8 cu.ft. or $3.90 and the potato chips at $4.80 divided by 3.18 cu.ft. or $1.51.

From the above it is evident that the anticipated ratio of potato chip delivery expense to the value of the load delivered will be two to three times that for ordinary groceries subject to corrections for volume, delivery radius and any work done by the driver, other than in actual delivery operations. The corrections, of course, must be worked out on a specific basis.

Here is part of the Schuler retail delivery fleet, which operates within a 30 mile radius of the various warehouses. They serve New York State, the New England area, and part of Pennsylvania. These trucks also handle store deliveries and retail merchandise.

Processing Food For Sterilization

PART III—Correct retort hook-ups depend on adequate understanding of steam-and-air mixtures. High-short sterilization is here, but high frequency sterilization has not yet reached the stage of practicality

By C. OLIN BALL, Director, Process and Products Research
Owens-Illinois Glass Company, Toledo, Ohio

HEATING Method IIC is the method universally used for containers that do not require retort pressure greater than the saturation pressure of steam at processing temperature.

Because all space in the retort not occupied by containers, crates, etc. is filled with air before steam is turned into the retort, there is a degree of non-uniformity in temperature in the retort until all of the air is expelled. For this reason an understanding of the principles pertaining to the behavior of air and steam mixtures is vital in this field of processing.

Fig. 5 is a schematic drawing* of a commonly used hook-up for vertical retorts employed for processing in steam.

* Diagram prepared by L. T. Moline (now in Research Department, Continental Can Company) for use of Owens-Illinois Can Company (absorbed in 1944 by Continental Can Company).

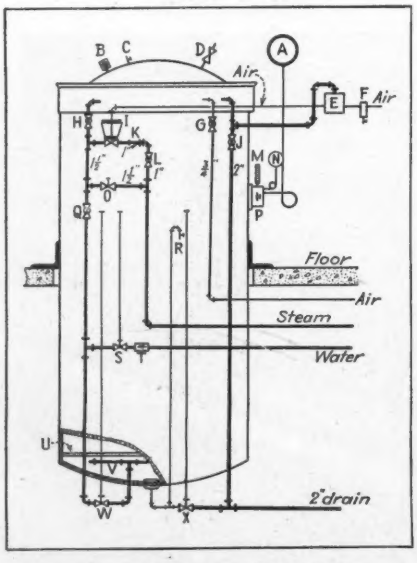


Fig. 5. Retort hook-up with automatic controls for processing containers in steam. Adequate bleeding to remove entrapped air is provided.

Water Processing

Heating Method IID is the accepted method for processing containers that require retort pressure greater than the saturation pressure of steam at the processing temperature. These include glass containers in general because the strength of the grip of container-covers onto the glass containers is not sufficient to resist the force of the internal pressure during the process. This tends to remove the covers unless external pressure is greater than the saturation pressure of the steam. Pressure above saturated steam pressure at the water temperature is provided by compressed air in the headspace of the retort.

In this method of processing, all containers are immersed in water that is kept in agitation to give good distribution of temperature. This gives uniformity of temperature throughout the retort during all stages of the process—even a better distribution during the coming-up and cooling periods than is obtained in the all-steam process.

Even though heating of containers by water does not involve the transfer of energy from latent heat, the rate of heating is essentially as great as that by saturated steam because the concentration of water molecules, from which energy is transferred, is very high compared to the concentration of molecules in steam or air.

Fig. 6 is a schematic drawing of a commonly-used hook-up for vertical retorts employed for processing containers in water.

High-Frequency Electrical Heating

Heating Method III, employing the use of high-frequency electrical waves, has received serious atten-

Legend for Fig. 5

A Temperature recorder
B ¾″ gate valve
C ⅛″ pet cock (Bleed when processing steam is admitted at bottom)
D Safety valve
E Pressure controller for steam entering retort
F Air strainer
G ¾″ valve (Air inlet for air and water pressure cooling)
H 1½″ valve 1 (Steam inlet for steam and water pressure cooling)
2 (Steam inlet for processing using bottom venting)
3 (Water inlet when cooling water is admitted at top)
I Air operated control valve (Steam for processing or for maintaining pressure during cooling if air pressure is not used)
J 2″ valve (Overflow to drain)
K Steam strainer
L 1″ valve steam line to controller
M Mercury thermometer (Range 170 deg. F. to 270 deg. F.)
N Compound gage (30 in. vac.—30 lb. pressure)
O 1½″ valve (Steam by-pass for come up)
P Pet cock (Bleed in thermometer pocket)
Q 1½″ valve (Steam inlet at bottom)
R Bleed cock (Bleeding during process using steam inlet at top)
S 1½″ valve (cooling water to top or bottom)
T 1½″ check valve
U Support for crates
V 1″ pipe (Steam spreader)
W 1½″ valve (Bottom steam inlet for processing)
(Cooling water inlet at bottom)
X 2″ valve (Drain)
Air lines to instruments ⅛″ pipe

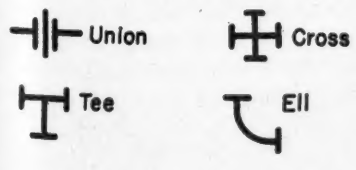
Tee Ell

tion experimentally from the food processing industry for at least 15 years but it has never reached the stage of practical application. During the recent war, the pace of experimentation was greatly accelerated, and with the employment of improvements in high-frequency generators, the wish for success has been transformed into at least a hope, with some basis for expectation that it will be realized in the not too distant future.

An advance in technic that is being introduced into investigations of this method, and appears to offer promise of overcoming some of the difficulties encountered in past experimentation, is a shift into the ultra high-frequency field. Waves having frequencies expressed in hundreds or thousands of megacycles per second have been neglected in experiments on food sterilization. Perhaps this is because, in the field in which high-frequency heating has found its most extensive application, metallurgy, the practical optimum frequency is about 1 mc.

Legend for Fig. 6

- *A* Air-operated temperature recorder-controller
- *B* Air-operated pressure recorder-controller
- *C1* Air valve (to operate controllers)
- *C2* ½" Valve (air to top)
- *D* 1½" Air-operated diaphragm motor valve (steam supply)
- *E1* 2" Valve (steam supply)
- *E2* 2" Valve (steam to bottom)
- *E3* 1½" Valve, extended stem (steam by-pass to bottom)
- *E4* 1½" Valve (steam to top)
- *F1* ½" Check valve (air supply)
- *F2* Check valve (air to bottom)
- *G* Temperature controller bulb
- *H* Steam spreader pipes
- *J* Support for retort crates
- *K* Water inlet-and-outlet fitting
- *M* Safety blow-off valve
- *N1* 1½" Valve (water to bottom)
- *N2* 1½" Valve (water to top)
- *N3* 2" Valve (drain)
- *N4* 2" Valve (overflow by-pass)
- *N5* 2" Valve (overflow)
- *O* 1½" Check valve (water supply)
- *P* 1½" Air-operated diaphragm motor valve (pressure)
- *Q* Pet cock for gaging water level
- *R* Pressure gage
- *S* Thermometer pocket
- *T* Mercury thermometer (170 deg. F. to 270 deg. F.)
- *U* Safety blow-off valve (overflow)



Prior to the discussion of the behavior of steam and air, completed in Part II, it was emphasized that this subject has much greater importance in processing food than is indicated by its association with the voluntary employment of mixtures of steam and air. It is hoped that the explanation of the principles involved has presented clearly the reason why steam and air methods of processing have become obsolete. Pure steam processing, however, discussed in this article, contains problems in which all phenomena of steam and air mixtures play a prominent part because the first step in a pure steam process is the sweeping of air from the retort through displacement by steam and because commercially generated steam contains air.—The Editors.

O. E. Dotson, physicist in Owens-Illinois Glass Co., process and product research division, in a report, writes as follows:

"Dielectric units are nearly always tube oscillators, allowing great flexibility in frequency, output and voltage. The highest practical frequency obtained by present-day oscillators, with satisfactory power output, is about 1000 megacycles per second, or 1000 times as great as the practical optimum for metallurgical purposes, although frequencies as high as 5 mc./s. have been used for extremely thin case-hardening."

The foregoing statement was made without the benefit of knowledge of war-time developments of which public disclosures have not been made.

According to Dotson, in heating food products, the optimum frequency depends upon the product and the container chosen.

The effect upon progress in the food sterilization field of bringing into use ultra high-frequency generators will be interesting to watch.

Obviously a method of processing which employs high-frequency electrical treatment of foods should be classified as a short method of sterilization. Present indications seem to be, however, that at least until further improvements can be made in high-frequency generation technic, this method of sterilization, employing either inductive or dielectric heating, will compare unfavorably in cost with high-short sterilization methods which employ steam as a heating medium. It appears, therefore, that the first practical use of high-frequency electrical sterilization by heat will be

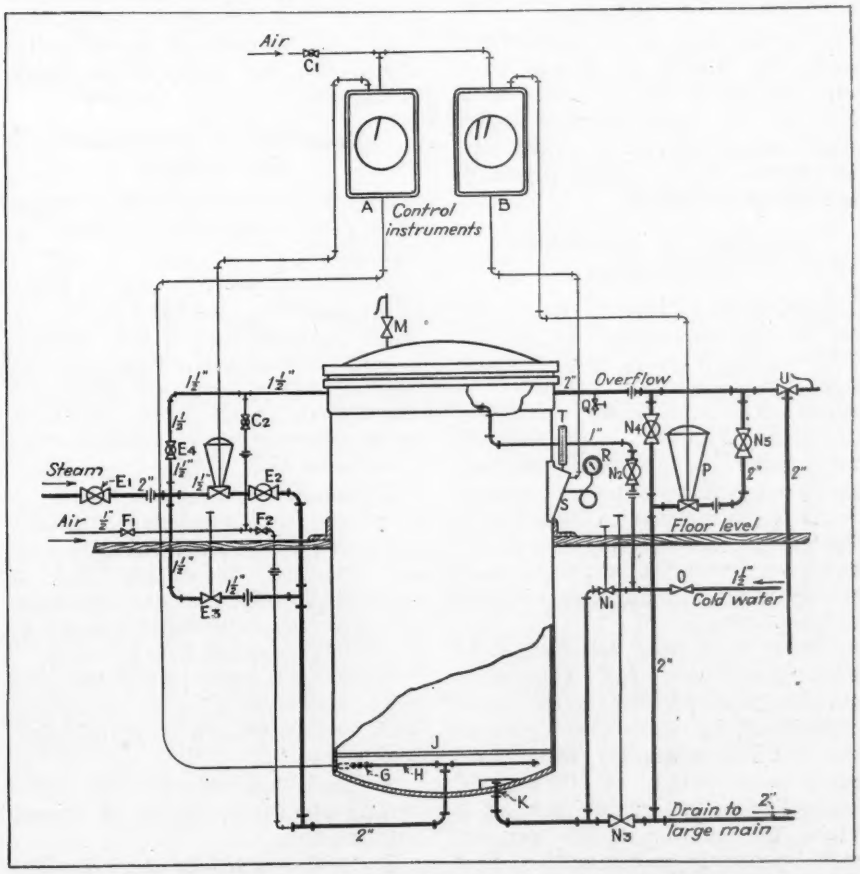


Fig. 6. Retort hook-up for processing containers in hot water. Supplementary air pressure is needed to hold on the container lids during entire process.

Large "still" retort, equipped for processing in water. Instruments for indicating and recording temperature and pressure are mounted for convenient inspection.

with foods that do not lend themselves to high-short sterilization with the use of steam or hot water. The use of ultra high-frequency waves may, however, uncover a new field beyond that of either inductive or dielectric heating.

Principle of High-Short Sterilization

From facts already given, we are led to the conclusion that by increasing the rate of heat penetration into a food, that is impaired in quality by the ordinary sterilizing process, and by raising the processing temperature, we shall improve the quality of the finished product. We conclude also that, within limits, the amount of improvement will be in proportion to the increase in rate of heat penetration and the increase in temperature.

The rate of heat penetration of whole-grain corn, for example, is quite high, especially in the small containers. If whole-grain corn in the smallest container were processed commercially at 300 deg. F. instead of at 250 or 240 deg., as is usual, the quality of the product would probably be better than that of corn produced today. The principal obstacle to processing at such a high temperature is the difficulty of carrying out the faultless retort manipulation that is required.

Definition of High-Short Sterilization

The following definition of high-short sterilization was given by Ball, 1938:

High-short sterilization of foods is sterilization by heat applied for times ranging from a few seconds to a few minutes. High-short sterilization implies heat penetration so rapid that, to obtain it, the food must either be heated in bulk or in containers that are kept in violent agitation. The maximum length of a process in this category must be arbitrarily chosen. We believe we are justified in stating that a process in which the heat treatment is longer than six minutes is not a high-short sterilization process.

Under the preceding definition, high-short sterilization methods were classified as of the following five types:

1. Food heated, but not completely sterilized, before it is put into the can.
2. Food completely sterilized before it is put into the can.
3. Food heated in the can before sealing, with sterilization completed after sealing.
4. Food heated in the can and completely sterilized before sealing.
5. Food heated in the can after sealing.

Differing Procedures

Under Type 1, containers would be filled with food at 250 deg. F. or higher, sealed immediately, and held long enough before cooling to permit the sterilization of the interior surfaces of the container to be accomplished by heat from the food.

There are two variations of the Type 2 process. In the first, the cans are heated after sealing to destroy such bacteria as may have contaminated the food during the filling and sealing operations; in the second, the containers are not heated after sealing because the containers are pre-sterilized and are filled and sealed under aseptic conditions. The latter is the only case among the types of high-short processing listed above in which pre-sterilization of the container is required.

Under the Type 3 process, ideal operation requires that the container be sealed as soon as the desired sterilizing temperature is reached in the container and that, before cooling, the container then be held long enough to permit the food and the interior surfaces of the container to be sterilized by the heat in the food. When the temperature imparted to the food is higher than water boiling temperature at atmospheric pressure, the operations of heating the food and sealing the container must take place under sufficient external pressure to prevent boiling of the food before sealing.

In defining the Type 4 process, sterilizing effect after the container is sealed is neglected. Sterilization is accomplished in the open container. There are two variations in this process. In the first, the food is not cooled before the container is sealed; in the second, the food is cooled after sterilization in the container before sealing.

To carry out a Type 5 process, one must agitate the container of food violently during the heat treatment in order to obtain rapid changes of temperature in the food. Temperature changes that are produced in this manner, however, are not as rapid as those that are possible when the food is treated in bulk. High-short processes of this type, therefore, must be of longer

(*Turn to page* 208)

EDITORIALS

LAURENCE V. BURTON, Editor

Needed: Three Commodities

JULIEN ELFENBEIN, who knows plenty about merchandising home furnishings, has said:

"The producer in 1950 will produce three kinds of commodities: (a) His product; (b) product information; (c) ideas for selling a product. If he produces only a product he's only producing one-third of a business."

His philosophy is sound for the food processing industry as well as for house furnishings.

While most technical production men are not particularly merchandising-minded, they can satisfy requirement (c) above by developing taste appeal to the maximum. Given a product that tastes so good that it excels all others, the only obstacle to great success is high production costs.

S. 140

S.140, "A bill to create an executive department of the government to be known as the Department of Health, Education and Security" has been introduced in the Senate by Senator Fulbright and is now in the Committee on Expenditures in the Executive Department.

The bill provides for three Under Secretaries, one of whom shall be a licensed doctor of medicine. Among other duties he would supervise the U.S. Public Health Service and the Food and Drug Administration. Those in the know believe F&DA would ultimately be absorbed by USPHS, a possibility that the drug and cosmetic industries vigorously oppose. As it now stands the principal purpose of the bill is to collect a host of independent agencies under a new cabinet officer. But with the problems of greater magnitude claiming Congressional attention S.140 is not expected to get out of committee in the near future.

A Problem of Ethics

MAYBE we are doing an injustice to our foreign readers by answering their inquiries in terms of American experience. Some nations have such ineffectual food laws that one could poison the whole community without a rebuke or slap on the wrist for doing it. Yet, even when such laxity is permitted by law, our conscience will not allow us to pass along the practices that are not permitted in the United States.

From the Levant came such an inquiry: What is the proper preservative to put in milk to keep it from souring? Presumably the writer had heard that fluid milk in the U.S.A. will keep sweet for a week in a mechanical refrigerator, and had erroneously concluded it contained a preservative.

Yet if cleanliness and sanitation and pasteurization are all that are needed and we tell that to a person residing in a locality where sanitation is almost unknown, are we doing the right thing? Frankly we don't know. Nevertheless, the cause of improved food technology will not be advanced if we are parties to what we regard as unethical practices. Nor do we believe that world health will be improved by practices prohibited in this country. On the other hand there are plenty of sources of such knowledge, and not for a minute do we believe that preaching sanitation will deprive a Levantine dairyman of a list of the things that may be his objective.

Can You Do a Tough Job?

Want to make $100?

FOOD INDUSTRIES will give $100 for each of the three best articles about difficult, mean or unpleasant jobs around the food plant and an explanation of how to do them easier or better. Like cleaning sewers, getting rid of spoils, cleaning bottles washers, plant fumigation, handling customers' complaints, taking physical inventory, breaking in green help—any job you don't enjoy.

This offer is open only to subscribers of FOOD INDUSTRIES or employees of companies where a company subscription comes to the plant where they work. In addition to $100 each for the three best discussions, we will also pay regular author's rates for all other such articles on difficult or unpleasant jobs that we publish, even if they don't win the prize rate.

Articles must describe a job in a food plant that you or somebody hates to do, then must tell why you or your subordinates hate it, next how you have found it can be done easier, or else what could be done, or should have been done to make it easier, or more pleasant. Be sure also to send photos or diagrams with your article so that somebody else can learn how to do the same job more easily. You can tell it in from 200 to 2000 words. This ought to be a cinch for engineers, mechanics, maintenance men, foremen, or "mopupuses." But technologists, superintendents and production managers also have mean jobs—even presidents have their pet hates. Here's a chance to help the other fellow.

This offer is good until July 1, 1947. The editors are the judges and their decision is final. Address your letter to the "Tough Job Editor."

Better Way to Reduce Costs

ONE of the large non-food manufacturers in the country has a policy that the food industry may find interesting. It invests in capital goods that reduce the cost of production without notably increasing the volume of production.

This policy recognizes that, if everybody gets the bright idea of increasing volume in order to achieve lower costs, an intolerable burden will be placed on sales departments.

Effect of "MAY HAVE" Clause

DESIGN of new plants is being influenced by the government's campaign under the "MAY HAVE" clause in the Food, Drug and Cosmetic Act, particularly by the campaign against foreign matter that can be detected only by the microscope.

One of the new plants is so designed that all raw materials entering the premises must pass through fumigating chambers, at the rate of five carloads a day, where methyl bromide treatment will kill all forms of insect life. The cost of the operation is not excessive and is far cheaper than loss of product and good will by seizure for unwitting violations of the law and its regulations.

Whether this commendable precaution will remove all sources of potential trouble remains to be seen. It will appear that fumigation must also be supplemented by suitable cleaning operations to remove any dead insects or fragments, should the incoming raw material carry its normal "quota" from the farm.

Trend to Chemical By-Products

THE type of thinking that automatically considers wastes from food plants as suitable for tankage or animal feeds will be at a competitive disadvantage in the near future. Such a means of disposal of plant wastes and byproducts is about the easiest way out, and most things that are easy seldom command good prices.

A more enlightened approach to waste and byproduct disposal is to ascertain the highest possible values that can be created from the material available. Even the conversion of such things to human foods may not be the appropriate policy.

Many food companies are entering the production of chemicals that may or may not have a food use. Citric acid, tartaric acid, stearic acid, glycerol, amino acids—pure or mixed, are some of the obvious chemical products. Quaker Oats Co. produces four chemicals known as furans from oat hulls. Armour & Co. makes a series of complex amino derivatives, as well as its biologicals. Sheffield Farms has a chemurgic division that produces a series of derivatives from lactose and casein. Ursolic acid is made from cranberry skins. Pectin is widely made by a number of food firms from apple and citrus peel. And waxes from sugar cane.

The foregoing are merely those that come to mind in a few minutes and do not represent an exhaustive study. All are products of well-handled research departments.

Should you go into the chemical byproduct business it would be well to profit by the experience of some of the pioneers: Selling chemicals calls for a different breed of salesmen than food salesmen. The introduction of new and unusual chemicals is wholly different from persuading the public to eat a new food. Yet the profits from chemicals are often far above the profits of feed and fertilizer byproducts.

The idea of higher valued byproducts should be in the minds of the tops of alert food processing companies.

Tricks With Onions

SOMETHING apparently new in food preservation has been unearthed in Germany by British investigators, reported in British Intelligence Objectives Survey Final Report 183, Item 22. Dr. G. Krause, of Munich, inventor of the freeze drum concentrator (See FOOD INDUSTRIES April, 1946) says that it can be used to produce concentrated onion juice, one freeze removing 50 percent of the water from expressed onion juice.

"The juice concentrate," says the report, "is used for flavoring soups and, owing to its high mustard oil content, will keep indefinitely without further processing."

Krause also told the BIOS investigators that the residual onion pulp, after pressing the juice, could be dried and made into soup mixes that had as good a flavor as mixes made with dried complete onions.

His statement tends to confirm a belief that much of the volatile flavor of the onion is lost in commercial dehydration. It must be remembered, however, that he was being interrogated by military conquerors and may not have told the truth, the whole truth and nothing but the truth.

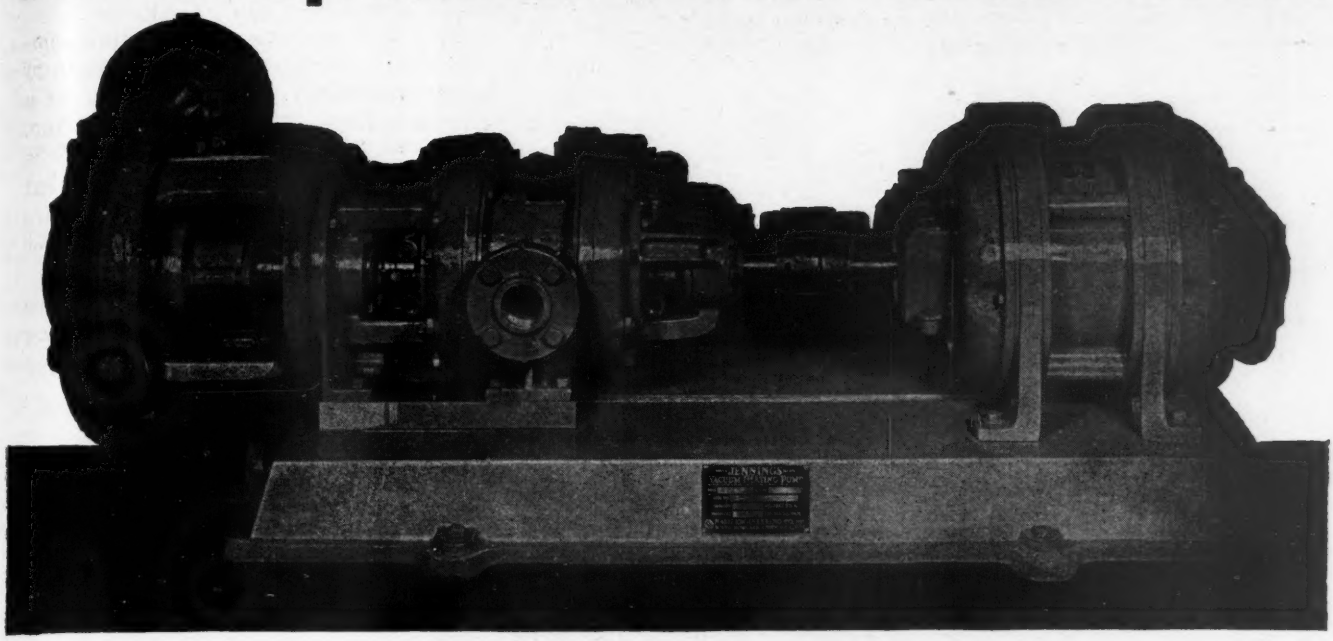
Silicones Find New Uses

SILICONE lacquers and varnishes are undergoing numerous tests as possible substitutes for grease in baking pans. Although no reports on them have been made officially public, the unofficial progress reports show great promise. Should such silicone coatings be adopted they will obviate the job of pan-greasing and may eliminate a source of odor around the shop that frequently becomes the characteristic flavor of commercially baked goods.

Silicone lubricants are finding favor in bearings in hot locations, such as oven bearings. As long as the temperature does not rise above about 500 deg. F the silicone grease retains its lubricating character.

Food Industries would be glad to learn of other new uses for these remarkable materials.

Nash—the Perfected Vacuum Pump for Evaporators and Condensers

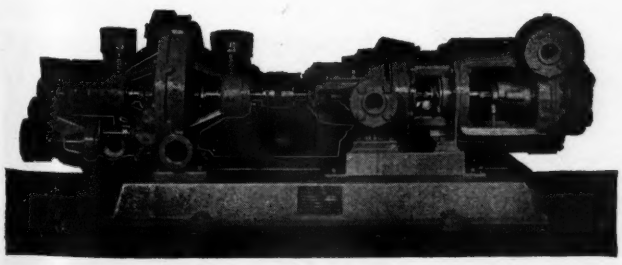


COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.



THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

NASH ENGINEERING COMPANY

SOUTH NORWALK • CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS

Smart Labels

To provide greater merchandising appeal and to conform more closely to basic designs and colors used on other company packages, Swift & Co., Chicago, is using a set of newly designed labels for its Savor-tite canned meat line.

The new labels follow a simplified pattern which places the company and product names on solid color backgrounds. Previously, these names had been carried on three bands of varying colors. The band pattern, considered impractical for the horizontally shaped packages, has been discarded entirely in the new label. Swift's standard tints of red and blue are used.

The words "Perishable — Keep Under Refrigeration" have been given more prominence, conforming with recently revised government regulations covering that point. All unnecessary copy has been eliminated from the labels and a more modern type face is used. Greater emphasis is placed on product name for easier identification.

Having changed the product formula of its dog meal, Swift also designed a new bag in both consumer and commercial sizes for that product. Lettering is done in red, blue and black with silhouetted dog caricatures in blue.

Principal change in the formula is the addition of more fat content. This is done by a Swift & Co. process which retards rancidity and allows the meal to be stored under non-refrigerated conditions.

Steak Rations

STEAK sandwiches are the topic of present discussions between B. W. Gardner, Jr., chief, animal products section, Quartermaster Food and Container Institute, and officials of the Lake Odessa Canning Co., Lake Odessa, Mich.

Initial production of canned chip steaks, pork steaks and fried ham has begun at the plant. The meats will be included in an "In Flight" ration consisting of one can of bread, one can of cake or cookies, one of meat, one of fruit juice and a can containing coffee, sugar, gum and candy.

The Army plans to furnish the sandwich menu to fighter and reconnaissance pilots to be eaten while in the air.

Successful canning of these new meat items will undoubtedly lead to the eventual production of similar foods for the civilian market. These would be particularly useful to sportsmen, explorers and persons living in isolated areas.

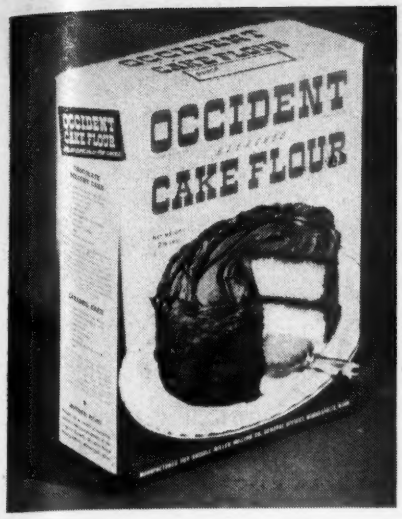
Canned Dinners

AMONG the postwar offerings of Stahl-Meyer, Inc., New York, are two new soups—lentil with frankfurts and pea soup with frankfurts. Then there is the group called "Pantry Pals". This includes corned beef and cabbage, and spareribs and sauerkraut—very recent additions, along with beef stew and chile con carne.

The soups need only to be heated. Addition of milk or water is unnecessary. Contents of the 1 lb. cans include beef bone stock, lentils or peas, beef, pork, onions, butter, salt, wheat flour, spice, sugar, sodium nitrate and sodium nitrite.

The canned meals should be a boon to the homemaker in adding variety to hurried dinners. Contents are to be simmered for a few minutes and that's all there is to preparing a tasty dish.

The corned beef and cabbage is accompanied by potatoes, beef broth and spices. Net weight also is 1 lb.



Cake Flour

A BRIGHT six-color package is used for the newest product of Russell-Miller Milling Co., Minneapolis. Housewives will easily spot the bright package of bleached cake flour which bears a color photo of a delectable chocolate cake.

Occident Cake Flour, made from soft wheat selected for its cake making qualities, is being introduced through extensive newspaper advertising and merchandising programs.

The director of the Occident home baking institute has developed many new recipes and a feature of the new package is the complete illustrated recipe for the fudge-frosted cake appearing on the face of the package. Directions for other cakes appear on the side panels.

Package contains 2¾ lb.

Revamped

ONE of the major units of The Glidden Co., Cleveland, has just completed an eight year redesigning and repackaging program which entailed a slow absorption of many brand names acquired by the company during its expansion program of the thirties.

The several hundred Durkee Famous Foods products, including such items as margarine, spices, shortening, Worcestershire sauce and coconut, now bear a large red-lettered "Durkee" on backgrounds of white and green.

Identification of the contents is carried in contrasting and harmonizing colors below the brand name. Spice containers have been standardized into uniform shapes and sizes.

Product Identification

A NUMBER of changes have been made in redesigning The Tetley Tea Company's tea bags package.

Purpose behind the changes is to give added product identification by using the elephant's head, long a trade-mark on other Tetley Tea cartons. This trade-mark appears on both ends of the new box.

The bottom of the package, formerly blank, now provides the space for a copy message to be changed from time to time.

Directions for brewing have been placed on the flaps which are tucked into the box, so that they are not likely to escape the housewife's eye. Color scheme still is blue and white against a background of silver.

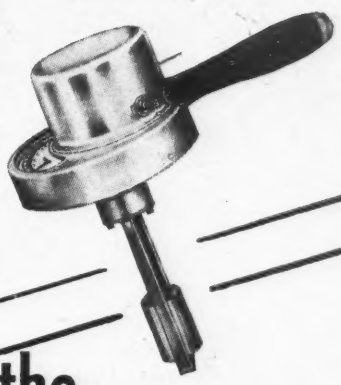
Cherry Bottle Revamped

AFTER months of exhaustive study, The Maraschino Cherry & Glace Fruit Assoc., in conjunction with the Glass Container Manufacturers Institute, has come up with a new standardized container to replace the old vase shaped cherry bottle.

The original has been attractive but highly impractical according to present day standards. It is difficult to remove the contents without

are you stuck

with a
Viscosity Problem
too?



the
BROOKFIELD
synchro-lectric
VISCOSIMETER
is
rapid
sturdy
simple
accurate
portable

Send for Bulletin giving complete information and description.

BROOKFIELD
ENGINEERING LABORATORIES
BOX 603-F SHARON, MASS.

NEW PACKAGES & PRODUCTS

Smart Labels

To provide greater merchandising appeal and to conform more closely to basic designs and colors used on other company packages, Swift & Co., Chicago, is using a set of newly designed labels for its Savor-tite canned meat line.

The new labels follow a simplified pattern which places the company and product names on solid color backgrounds. Previously, these names had been carried on three bands of varying colors. The band pattern, considered impractical for the horizontally shaped packages, has been discarded entirely in the new label. Swift's standard tints of red and blue are used.

The words "Perishable — Keep Under Refrigeration" have been given more prominence, conforming with recently revised government regulations covering that point. All unnecessary copy has been eliminated from the labels and a more modern type face is used. Greater emphasis is placed on product name for easier identification.

Having changed the product formula of its dog meal, Swift also designed a new bag in both consumer and commercial sizes for that product. Lettering is done in red, blue and black with silhouetted dog caricatures in blue.

Principal change in the formula is the addition of more fat content. This is done by a Swift & Co. process which retards rancidity and allows the meal to be stored under non-refrigerated conditions.

Steak Rations

STEAK sandwiches are the topic of present discussions between B. W. Gardner, Jr., chief, animal products section, Quartermaster Food and Container Institute, and officials of the Lake Odessa Canning Co., Lake Odessa, Mich.

Initial production of canned chip steaks, pork steaks and fried ham has begun at the plant. The meats will be included in an "In Flight" ration consisting of one can of bread, one can of cake or cookies, one of meat, one of fruit juice and a can containing coffee, sugar, gum and candy.

The Army plans to furnish the sandwich menu to fighter and reconnaissance pilots to be eaten while in the air.

Successful canning of these new meat items will undoubtedly lead to the eventual production of similar foods for the civilian market. These would be particularly useful to sportsmen, explorers and persons living in isolated areas.

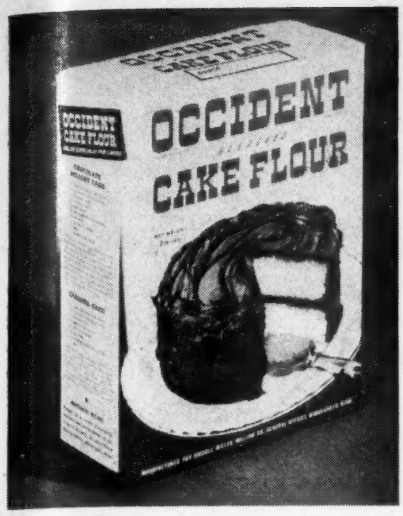
Canned Dinners

AMONG the postwar offerings of Stahl-Meyer, Inc., New York, are two new soups—lentil with frankfurts and pea soup with frankfurts. Then there is the group called "Pantry Pals". This includes corned beef and cabbage, and spareribs and sauerkraut—very recent additions, along with beef stew and chile con carne.

The soups need only to be heated. Addition of milk or water is unnecessary. Contents of the 1 lb. cans include beef bone stock, lentils or peas, beef, pork, onions, butter, salt, wheat flour, spice, sugar, sodium nitrate and sodium nitrite.

The canned meals should be a boon to the homemaker in adding variety to hurried dinners. Contents are to be simmered for a few minutes and that's all there is to preparing a tasty dish.

The corned beef and cabbage is accompanied by potatoes, beef broth and spices. Net weight also is 1 lb.



Cake Flour

A BRIGHT six-color package is used for the newest product of Russell-Miller Milling Co., Minneapolis. Housewives will easily spot the bright package of bleached cake flour which bears a color photo of a delectable chocolate cake.

Occident Cake Flour, made from soft wheat selected for its cake making qualities, is being introduced through extensive newspaper advertising and merchandising programs.

The director of the Occident home baking institute has developed many new recipes and a feature of the new package is the complete illustrated recipe for the fudge-frosted cake appearing on the face of the package. Directions for other cakes appear on the side panels.

Package contains 2¾ lb.

Revamped

ONE of the major units of The Glidden Co., Cleveland, has just completed an eight year redesigning and repackaging program which entailed a slow absorption of many brand names acquired by the company during its expansion program of the thirties.

The several hundred Durkee Famous Foods products, including such items as margarine, spices, shortening, Worcestershire sauce and coconut, now bear a large red-lettered "Durkee" on backgrounds of white and green.

Identification of the contents is carried in contrasting and harmonizing colors below the brand name. Spice containers have been standardized into uniform shapes and sizes.

Product Identification

A NUMBER of changes have been made in redesigning The Tetley Tea Company's tea bags package.

Purpose behind the changes is to give added product identification by using the elephant's head, long a trade-mark on other Tetley Tea cartons. This trade-mark appears on both ends of the new box.

The bottom of the package, formerly blank, now provides the space for a copy message to be changed from time to time.

Directions for brewing have been placed on the flaps which are tucked into the box, so that they are not likely to escape the housewife's eye. Color scheme still is blue and white against a background of silver.

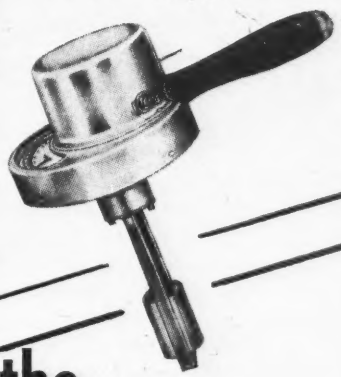
Cherry Bottle Revamped

AFTER months of exhaustive study, The Maraschino Cherry & Glace Fruit Assoc., in conjunction with the Glass Container Manufacturers Institute, has come up with a new standardized container to replace the old vase shaped cherry bottle.

The original has been attractive but highly impractical according to present day standards. It is difficult to remove the contents without

are you stuck

with a
Viscosity Problem
too?

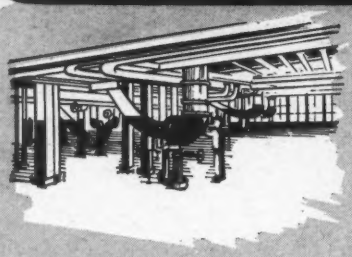


the
BROOKFIELD
synchro-lectric
VISCOSIMETER
is
rapid
sturdy
simple
accurate
portable

Send for Bulletin giving complete information and description.

BROOKFIELD
ENGINEERING LABORATORIES
BOX 603-F, SHARON, MASS.

INSURE AGAINST SURFACE FAILURES!

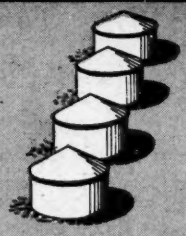


Abrasion-resistant

Ideal for concrete and brick floors, walls, ceilings. Easily cleaned, chemically resistant. Available in 12 colors.

Alkali-resistant

Unaffected by alkalies — extensively used as a lining for tank cars for transporting concentrated caustic soda.

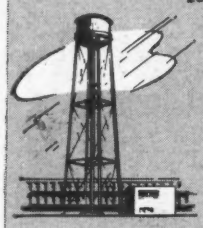


Petroleum-resistant

Positive protection against sour crude, gasolines, oils and greases—used throughout the industry for sour crude tanks, disposal tubing, submerged pumps and motors, line pipe, etc.

Weather-resistant

Long-lasting service on exposed surfaces reduces maintenance cost and prolongs structure life.

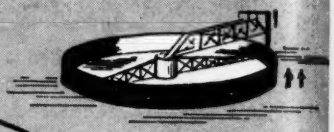


Amercoat

PLASTIC COATINGS

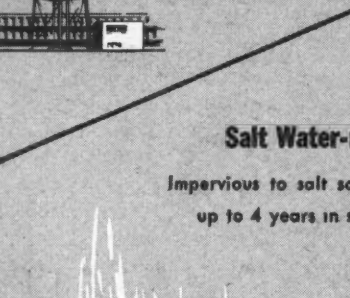
Acid-resistant

Protects against corrosion by nearly all chemicals and fumes except concentrated oxidizing acids.



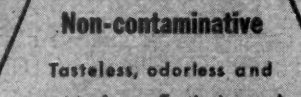
Salt Water-resistant

Impervious to salt solutions. Lasts up to 4 years in sea water.



Non-contaminative

Tasteless, odorless and non-toxic — effectively used for lining food product tanks and containers.



Sanitary

Approximates glass in resisting the harboring of bacteria, mold and fungi. Non-porous, non-absorptive. Reduces maintenance costs to a minimum.

Better protection for metal, concrete and wood surfaces

Amercoat has many outstanding advantages. Here is a tough, long-lasting coating that gives you many of the features of rubber, glass and other corrosion-resistant materials, at only a fraction of their cost. It is applied cold, easily and quickly, with either spray or brush—dries to touch in a few minutes. No baking is required. Surface is smooth and glossy—lasting many times as long as ordinary coatings. It is non-brittle and abrasion-resistant. After long service, repairs can be made in a few minutes, making it unnecessary to tie up costly equipment or maintain stand-by units. Amercoat can save you money in two ways—

1. Cut *maintenance costs of machinery, equipment and buildings.*
2. Cut *original cost of equipment by using less expensive materials—protected with Amercoat.*

Write for descriptive literature and name of supplier near you. **IMMEDIATE DELIVERY.**

AMERCOAT DIVISION, American Pipe & Construction Company

Department 5D, P.O. Box 3428, Terminal Annex, Los Angeles 54, California

FOOD INDUSTRY NEWS

GENERAL

Expiration of Tin Controls Feared by Canners, Can Makers

Strong central agency needed to allocate scant supplies, as well as to restrict can sizes and deal with tin cartel

CHAOS seems in prospect for both canners and can manufacturers if Congress fails to extend wartime control over tin. A vocal group on Capitol Hill says it favors throwing out the remaining controls, come what may. This is in direct opposition to the wishes of President Truman, who has asked for power to continue government control over a few scarce items, including tin.

If Congress does not act before March 31, when all controls end automatically, industry representatives fear for the future. There would be no strong central government agency to do business with the tin cartel. There would be no way to distribute the scanty supplies in an equitable manner. There would be no control over the unbridled desires of tin purchasers and the gap between supply and requirements would widen. A suggestion, which was in the conversational stage in mid-February, was to sacrifice the control over can sizes, but to retain the control over the general plate specifications in M-81, the tin can order. This seems practical. At the present time can manufacturers are allocating the supply of cans, using much the same method formerly used by the government, i.e. on the basis of historical use of the unfabricated tin plate. With only the plate specifications remaining on the books, canners would be permitted to specify the can sizes. If smaller sizes were ordered they would not be able to pack as much as in the larger can, which could be made from the same amount of tin plate. Can manufacturers would have more production troubles with odd-sized short runs.

Retention of plate specifications would also have the effect of holding in check the demands for heavier tin coatings. The slower movement of goods through retail channels has caused food processors to begin thinking in terms of longer shelf life. Manufacturers of cans are already reporting a demand for the heavier tin coatings of the pre-war era when all plate was made by the hot dip process. Experts claim that the electrolytic plate gives equal results with less tin and that any retreat on plate specifications would worsen the supply and requirements situation.

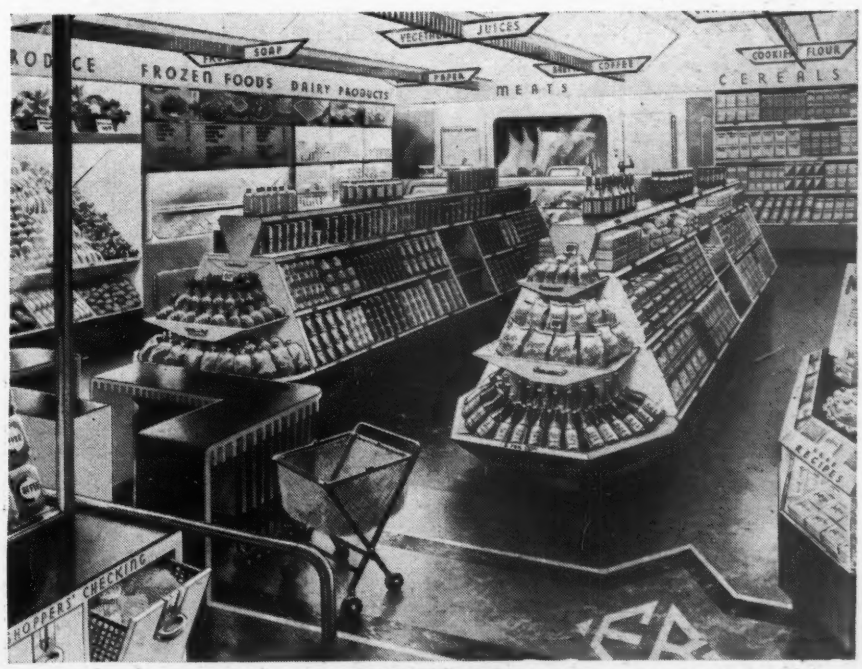
Beer Seizure Revives Preservative Dispute

THE reported F&DA seizure of 50 carloads of beer, produced by seven Chicago breweries, because of the presence of monochloracetic acid revives an old controversy that has been lying dormant in the food industry since 1942. Despite evidence that concentrations of the acid up to 300 p.p.m. were not injurious, F&DA ruled four years ago that its use would lead to seizure and prosecution of the user. None of the breweries involved used concentrations higher than 50 p.p.m., and most were below that figure.

The brewers maintain that the monochloracetic acid, which was used as a preservative, was strictly a wartime measure resulting from their restricted allocation of ingredients, that no injurious effects have ever been reported from such small concentrations, that at least one federal judge has ruled such use as permissible, and that it is being used as a preservative for other food products, which cannot be readily pasteurized, with no ill effects. There are also echoes of preprohibition days, indicating that the breweries are again being used as a political football to further the very active, though undercover efforts, of the present day drys.

As the beer was seized in the late months of 1946, some inkling of F&DA thinking may be contained in the annual report of Commissioner Paul B. Dunbar. It states that one manufacturer of a beverage base used "a poisonous preservative, monochloracetic acid." He sold enough of the product to produce 65,000,000 bottles of orange flavored beverage. "When illnesses were reported following the early use of the drink an immediate round-up of outstanding lots was made and the goods were destroyed under the supervision of local, state and federal inspectors."

Impartial observers feel that these seizures will at least serve to bring the controversy into the open.



LUSH SHOPPING

Consumer buying of that food produced by the processor should soon be one of the high spots of the day for the housewife. This grocery "parlor" is a model, small self-service store designed by Armstrong Cork Co. and the Retail Grocers Assn.

Expansion Outlay Is Approved by Borden's

CAPITAL expenditures of $26,000,000 for new construction, improvements and equipment replacements in 1947 have been authorized by the Borden Co.'s board of directors, according to President Theodore G. Montague.

Of the capital expenditures, Mr. Montague said, new authorizations total $14,000,000, while $12,000,000 has been carried over from the 1946 budget. Many 1946 projects were delayed because of material shortages. Rising building costs caused some plans to be changed. These factors will also determine whether the entire amount appropriated is spent in 1947.

Work now in progress includes combination milk and ice cream plants in New Orleans, La., and Miami, Fla.; remodeling of milk plants at Phoenix, Ariz., Fond du Lac, Wisc., Burlingame, Cal., and Houston, Dallas and San Antonio, Texas. Also well under way is a $1,750,000 soy fractionating plant at Kankakee, Ill., and a $1,500,000 coffee and Hemo plant expansion at Newport, N. Y.

Major projects completed in 1946, Mr. Montague said, included a food and pharmaceutical plant at Elgin, Ill.; a casein factory at Bainbridge, N. Y.; a formaldehyde plant at Springfield, Ore.; a milk plant at Oklahoma City, Okla.; and a resin adhesives unit at Kernersville, N. C.

FAO Commission Offers New World Food Plan

FORMAL proposal has been made by the Food and Agricultural Organization's preparatory commission of a plan to reach the objective of increased consumption and production of basic foods to bring about a worldwide health standard diet, and stabilized prices for agricultural products at levels fair to both consumers and producers. It is a compromise measure that avoids the criticism leveled at the World Food Board plan originally proposed by Sir John Boyd Orr, FAO director-general, but which arrives at essentially the same destination.

Most important of the final recommendations are those providing for:

1. An annual review of national agricultural and nutritional programs so that governments can appraise their own plans in the light of the world situation and better coordinate their efforts.

2. Development of international commodity agreements and other inter-governmental arrangements for individual commodities as a major device for stabilizing prices and expanding production and consumption.

3. Formation, as an integral part of FAO, of a World Food Council to serve as a policy link between FAO and the governments when the annual conference is not in session. The council would review commodity situations and existing and proposed commodity agreements, and initiate studies preparatory to other intergovernmental actions. This could be termed a continuation of the functions of the present International Emergency Food Council, the successor of the Combined Food Board.

4. The prompt creation by the United Nations of a temporary coordinating committee to facilitate negotiations and operation of intergovernmental arrangements for primary commodities—the committee to serve only until the International Trade Organization is set up, and to be particularly concerned with agricultural products.

Essential Differences

This plan differs from the World Food Board first proposed in a number of essential details. Under the WFB plan, prices of farm products would be stabilized in the international market by the purchase of surplus stocks in good years. These stocks would be held in storage for distribution in lean years, and would be sold at cut rates to under-nourished nations unable to finance their own purchases at prevailing prices. The United States, being the only surplus producing country, would be completely dominated by the consumer nations, and it would also be the nation that would have to foot the bill.

The new plan also proposes reserve stock of grains, such as wheat and rice, that can be stored for considerable periods without loss. Surpluses of perishable commodities may also be stored by transforming them into storable form by processing. Actually, reserves of three kinds are envisioned—working stocks, famine reserves, and price stabilization reserves.

Working stocks would be reserves against fluctuations in demand in the case of surplus-producing countries, and against fluctuations in supply in the case of importing countries. Each country would hold the stocks it considers desirable subject to commitments under an international agreement.

The famine reserve, to be made up of bread grains and rice, and possibly processed foods, would be held nationally by exporting and

"HOW MUCH DO YOU GET BACK ON THE EMPTY VAT?"

importing countries, to be used under conditions previously agreed upon. The amount to be carried by each country would be decided by international agreement and each nation would bear the cost of carrying its own share.

Buffer stocks for price stabilization would be held nationally but administered under internationally-agreed rules. This device can be applied to the control of prices when the supply or demand fluctuates sharply over the short term. It is recognized that it cannot solve the problem of persistent surpluses.

The commission also concluded that, under certain circumstances, commodity agreements might contain special provisions for sales at special prices for distribution to people in need of products for which there is no commercial demand at reasonable prices.

A trial run, to see how the stabilization features of the commission's proposal work out, probably will be made shortly. Wheat is expected to be the trial horse because of the wide measure of agreement between the delegations of both exporting and importing countries that may be used by the International Wheat Council, at its meeting in March.

Companies Merge

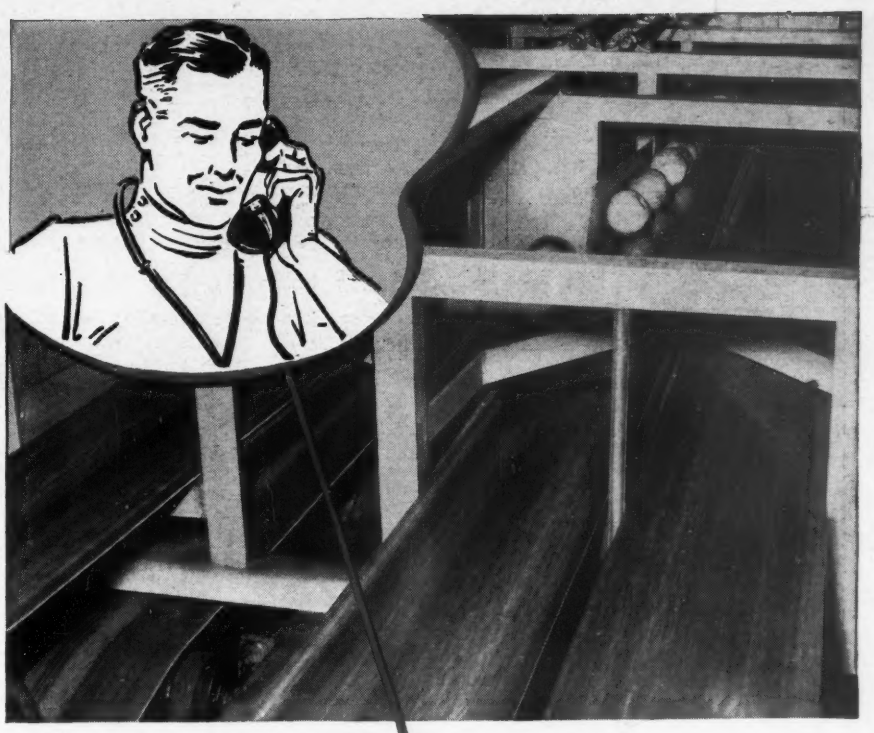
FROEDTERT GRAIN & MALTING CO., Milwaukee, Wis. and Rockwood & Co., chocolate manufacturers, Brooklyn, N. Y. have announced plans for a merger of the two companies subject to approval by the board of directors and stockholders of each company.

The two companies would be operated as divisions. No major changes are being made in management policies or personnel. Kurtis R. Froedtert is president and chairman of the board of Froedtert Grain & Malting Co., and H. Russell Burbank is president of Rockwood & Co.

Grants Continued

GRADUATE fellowships established at ten institutions of higher learning by Standard Brands Incorporated in 1945 have been continued for the academic year 1946-47, J. L. Bogert, vice-president in charge of research and development, has announced.

All fellowships are active. The particular faculties in charge at each institution selected the recipients, who will engage in research of their own choosing.



CALL for a SPECIALIST!
YES! CALL for KANRY-TEX

KANRY-TEX was made 'specially for you who process food. Globe research and exhaustive tests by Globe engineers have produced KANRY-TEX to exact specifications of performance and quality based on *your* requirements.

Leading canners and food processors insist on KANRY-TEX—the outstanding conveyor belting for their needs.

That means finer products and lower costs, of course. We'd like to send along, without obligation, some facts to prove these statements. Write today to your mill-supply house—or to us direct.

Some KANRY-TEX Features:

- Does not impart odor or taste.
- Resists moisture, alkali, fats, oils.
- Easily washable with hot water, live steam, or sterilizing agents.
- Long lasting—Economical.

GLOBE WOVEN BELTING CO.
1403 CLINTON ST., BUFFALO 6, N. Y.

GLOBE WOVEN BELTS

Wide World

MUSHROOM MINER

A miner's lamp is a useful piece of equipment to this young lady harvesting mushrooms in one of the many sheds operated by the West Mushroom Co., Salem, Ore. Uncultivated mushrooms are still picked in shady spots after rain, but under controlled conditions, such as is depicted here, deep darkness is maintained by more certain means.

Pickle Packers Hear Supply Discussion

AVAILABILITY of vital supplies for pickle packers during 1947, such as glass, tin, sugar and field labor, was the main topic of discussion at the 54th annual convention of the National Pickle Packers Association, in Chicago.

Carl Haberstick, Hazel-Atlas Glass Co., Wheeling, W. Va., in his summary of the glass container supply for pickle packers in 1947, predicted a maximum increase of 15 percent over 1946, dependent upon the availability of the essential soda-ash ingredient. He said that only a small percentage increase over 1946 in soda-ash producing capacity is expected in 1947. Further improvements in glass container supply can be made if the industry can stay on mass production basis and can maintain standardization and simplification of design. Demand for glass containers is indicated by the 112,000,000 gross produced in 1945 as compared to 51,000,000 gross in 1939.

Steel for tinplate is still critically short, according to R. L. Perin, Sales Manager, Central Division, Continental Can Co. Only 2,900,000 tons of steel for tinplate will be available in 1947 compared with an estimated need of 3,457,000 tons. There is little hope of an increased supply before the third quarter of 1947. New mills may be in operation by the latter part of the year. In view of these facts, there is still a shortage of 525,000 tons in steel production; about 15 percent under what is needed. In 1941, tin consumption was 134,695 tons for all uses. The estimated 1946 tin consumption was 81,000 tons and the estimated consumption of tin for 1947 is 90,000 tons with 31,777 tons of that amount estimated for tinplate production.

John C. Gardner, president, New York Coffee & Sugar Exchange, stated that approximately 6,800,000 tons of sugar will be available in 1947. That figure is still 600,000 tons short of normal supply, but 1,400,000 tons more than the 1946 supply. Mr. Gardner predicted that with the substantial increase in domestic, as well as world supply of sugar, the sugar problem should be non-existent by the middle of 1948. If the industrial allotments were increased from 60 to 80 percent for the last three-quarters of 1947, about 650,000 tons would be made available.

Availability of migratory field workers was discussed by Max C. Henderson, Michigan Field Crops, Inc. He spoke in favor of an act soon to be introduced in Congress creating a permanent farm-labor program under the direction of the Department of Agriculture; to be administered by the states. The states could follow through with machinery for the training of farmers in the teaching of skills to workers, formation of employer groups to provide a continuous chain of employment and inclusion of migrant workers in the community programs.

Officers and directors were voted to continue in office until the next election at the fall meeting pending the necessary changes in the constitution and by-laws to make the fall meeting the annual meeting and provide for the election of officers at that time instead of at the winter meeting in January.

Dehydrators Approve Reorganization Plan

APPROVAL of reorganization plans, revision of by-laws and dues schedule and election of officers were accomplished at the Annual Meeting of the National Dehydrators Association, held in Chicago, in January.

Reorganization centers around the appointment of Glenn G. Hoskins as managing director and Robert M. Green of the Hoskins organization as association secretary. The membership has been broadened to permit greater participation in association affairs by members of the allied trades. This objective is the basis for revision of the by-laws and a revamping of the dues schedule.

Joseph B. Pardieck, California Vegetable Concentrates, Inc., Huntington Park, Calif., was elected president and George E. Siebel, Little & Company, Chicago, vice-president.

Commission Revises Meat Industry Wages

A large-scale revision of the internal wage structures of the five largest meat packing companies, directed by the National War Labor Board more than two years ago, has been completed by the NWLB-created Meat Packing Commission.

The Commission dissolved in February with the issuance of a final report by Chairman Clark Kerr, director of the Institute of Industrial Relations, University of California, disclosing that the companies' annual wage bill was increased $5,000,000. This averages 1.8 cents an hour per employee, less than the 2-cent limit fixed by NWLB, Kerr said.

Retroactive wage adjustments, going back to 1942 in some cases, amounted to $15,000,000.

During the 20 months the Commission functioned, with participation by employer and union repre-

sentatives, it surveyed 100,000 job rates in nearly 100 plants. The jobs were slotted into 25 labor grades, each two and a half cents apart, making a span of 60 cents from the lowest to the highest labor grade. Previously, there had been as little as one-quarter cent separating some of the job rates.

Kerr praised the "high degree of cooperation" exhibited by the five companies and three unions in voluntarily agreeing to 90 percent of the new job rates and accepting the Commission's decisions in the other 10 percent.

By moving rates which were in between the 2½-cent steps up to the next highest grade level, approximately 65,000 job rates were raised, while 35,000 which already were at one of the 25 grade levels remained there. This adjustment cost an average of eight-tenths cents an hour for all employees. The reclassification of some jobs into higher grade levels, some as much as six grades, cost an average of another one cent an hour.

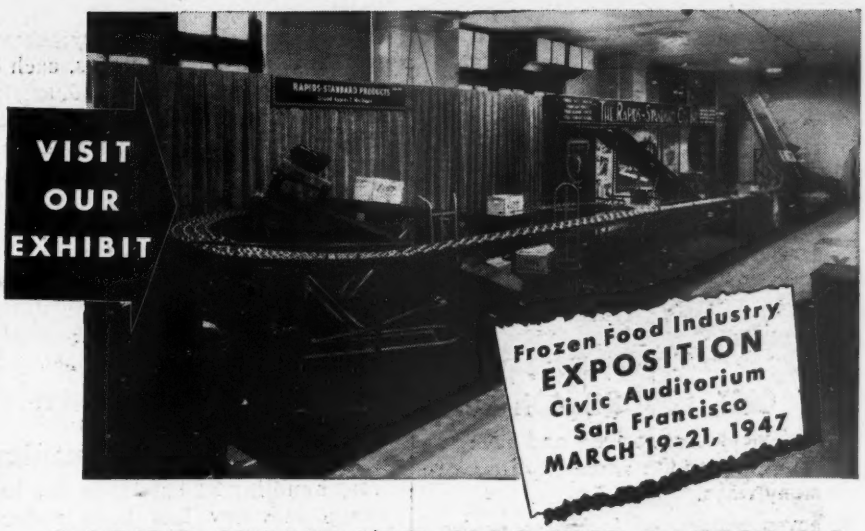
Companies involved were Armour & Co., Wilson & Co., Cudahy Packing Co., Swift & Co. and John A. Morrell & Co. Unions were C.I.O.'s Packinghouse Workers, A.F.L.'s Amalgamated Meat Cutters and Butchers and the National Brotherhood of Packinghouse Workers, an independent union.

Russian Canned Food Tops 1945 Production

RUSSIA'S production of canned fruit, berries and vegetables last year topped 1945 by 15 percent, the Ministry of Food Industry of the USSR recently revealed. At the peak of the season the ministry's canneries turned out 2,500,000 cans a day and some of them, mainly in southern and eastern areas are still continuing production. The program for the year as a whole has been completed ahead of time.

According to Jean Duche, chief of the Central Canneries Administration of the ministry, the 1947 target is another 15 percent increase in production as a stepping stone to the fulfillment of the five-year plan aim of surpassing the prewar level. To achieve the projected increase, all canneries the Germans wrecked during the war are to be restored and 10 new ones built.

At present the food ministry has 80 operating canning enterprises, all built during the prewar five-year plans. They include such large plants equipped with up-to-date Soviet machinery as the Kherson,



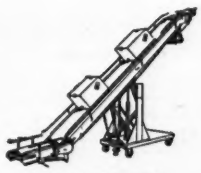
RAPIDS-STANDARD HAS THE LATEST IN

Handling Equipment

A few years ago both the frozen food industry and material handling were small factors in the country's economy. Both of these industries, through constant development and the use of the most modern techniques and methods, have advanced to a position of primary importance.

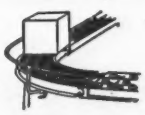
At the 1947 Frozen Food Exposition you can see the latest developments in equipment and methods for processing and handling frozen foods. At the Rapids-Standard Booth you can discuss your handling problems with a staff of factory-trained men who will be glad to consult with you and demonstrate the equipment to you. Here you can see for yourself the fine engineering and sturdy construction that are part of all Rapids-Standard equipment. DON'T MISS IT.

Featuring



RAPID POWER BOOSTER
Portable endless belt conveyor having many uses in lifting, stacking, carrying. Adjustable for height and angle of incline.

STEVEDORE, Jr.
Light weight but sturdy endless belt conveyor. Easily moved around by one man. Height and angle of incline adjustable. Lifts up to 200 pounds.



RAPID-WHEEL CONVEYOR
Portable Gravity conveyor. Extra strong but light enough for easy handling. Comes in convenient sections with many accessories.

RAPID-ROLLER CONVEYOR
Portable Gravity roller conveyor. Unique frame and roller construction combines sturdiness with minimum weight. Full group of stands, curves, guard rails and accessories.

DON'T MISS

The National Frozen Food Industry Exposition in the San Francisco Civic Auditorium, March 19-21, 1947.

VISIT US IN

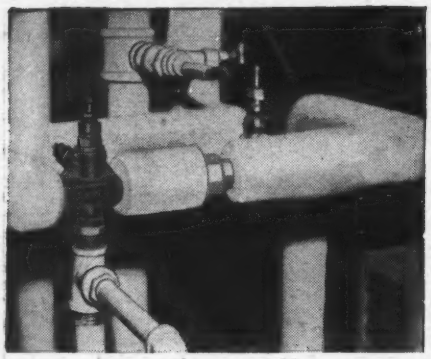
BOOTHS 109 - 110 - 111

Offices in Los Angeles, San Francisco, Portland, Seattle and other principal cities throughout the country.

Manufacturers of
STEEL FORGED CASTERS · TRUCKS · CONVEYORS · POWER BOOSTERS

The **Rapids-Standard Co., Inc.**

Sales Division — 361 Peoples National Bank Bldg., Grand Rapids 2, Mich.



LOW COST COOLING CONTROLS

Few devices cost so little and save so much—because the Sarco TR-40 saves in many ways.

It saves water and increases engine efficiency by maintaining correct jacket temperatures. It saves lubricating oil—prolongs the life of the equipment. On condensers and stills it saves up to 50% of the water and insures dependable process operations. It boosts production on degreasers and other tank control processes. Sizes ⅜ to 1½ inch. Calibrated for any temperature between 40 and 200 degrees F. Bulletin 700. 198

SARCO COMPANY, INC.
475 Fifth Avenue, New York 17, N. Y.
SARCO CANADA, LTD., 85 Richmond St. W., TORONTO 1, ONT.

Vi-Co

NATURAL "B" COMPLEX YEAST VITAMIN PRODUCTS AND YEAST DERIVATIVES

Plasmolyzed Yeast Extracts for FOOD and AMINO ACID PREPARATIONS

Vi-Co Plasmolyzed Yeast Extracts are prepared by enzyme digestion of brewers' yeast to yield a B complex product rich in essential amino acids. Amino acids provide the necessary "building blocks" for healthier and stronger bodies.

These products possess a definite "meat-like" flavor useful in enriching soups, bouillon cubes, tomato juice and other packaged foods. Such enriched foods are also of value for their natural B complex and high amino acid composition.

Consult us about your vitamin or yeast problems. Our technical staff can best advise you how Vi-Co products can be used to enrich your own products.

VICO PRODUCTS CO.
415 W. Scott St. • Chicago 10, Illinois

the Ukraine, and Krymskaya, North Caucasus, canneries, each of which turned out up to 80,000,000 cans of preserved foods annually before the war. Old Russia did not have a single modern cannery.

At present Soviet canneries turn out a greater assortment of canned foods than before the war and the trend is toward a further increase, Duche said. The number of different kinds of fruit and vegetable canned goods is now over 200.

Bottling Plants Stress Materials Handling

THE handling of bottles in the beverage industry has been reduced from seventeen to four times in the last ten years, declared William Geisler, vice-president and director of operations and engineering, of the Pepsi-Cola Co., Long Island City, N. Y. Modern materials handling machinery was credited with most of this handling reduction.

The Pepsi-Cola Co., Mr. Geisler said, is now engaged in relocating its plants with the aim of providing the most efficient handling of materials. Previously, he declared, plants were planned for location near distribution centers, but the present trend is to place the plant in the best location for materials handling and keep only the warehouse near the distribution point. Also under way, he said, is a redesign of the company's packages.

Portal Suit Study Shows Queer Facts

THE NATIONAL ASSOCIATION OF MANUFACTURERS claims to have uncovered some strange facts in a survey of portal-to-portal suits, made recently. Here are some of them:

One suit was for time in a plant that does not exist—and never did; one for time spent in a plant cafeteria of a company that has no cafeteria; many suits were filed on mimeographed forms; in most cases suits were filed without even discussing claims with the company; in some cases the suits were filed by national or international headquarters of the union, the local union having no active part. One suit demanded ten times the company's net worth; about half the companies reported they would have to cancel or modify expansion plans if the suits were successful, one-sixth of those remaining reported such action probable.

DEVELOPMENTS IN DISTRIBUTION

Meat Institute Urges More Scientific Study

A MORE scientific approach to the production of livestock and the distribution of meat will help assure adequate future meat supplies for consumers, R. J. Eggert, associate director of marketing of the American Meat Institute, recently told the livestock section of Illinois Farm and Home Week.

"What the meat packer is able to pay the producer for livestock," said Eggert, "largely is reflected by what the consumer pays for meat, plus the value of byproducts. Development of meat animals that will yield more of the kind of cuts the consumer wants most will help keep more meat on more tables more often and at the same time assure the grower of meat animals of a steady and profitable outlet."

Fruitfly Permits

THE DEPARTMENT OF AGRICULTURE announced last month that permits will be required for the movement of citrus fruits, effective February 10, from the area in Texas regulated on account of the Mexican fruitfly. Permit requirements were temporarily suspended on October 1, 1946, with the understanding that their use would be resumed upon the finding of adult egg-laying Mexican fruitflies during the current season. Because of the recent finding of a small number of such flies it is deemed advisable to resume the permit requirements, which will remain in effect as long as there is danger of dissemination of the insect through interstate shipments of regulated citrus fruits.

Pallet Bins Tested For Citrus Shipment

A TEST use of wire pallet bins in the shipment of orange and other citrus fruits recently indicated a considerable saving in labor both at the loading and unloading ends.

The run was made from the Polk Packing Co. plant in Winter Haven, Fla, to the A&P Co. in Detroit. Two pallet bins, manufactured by the Pittsburgh Steel Products Co., were employed. Oranges packed in bags were loaded into the bins and one bin was placed on top of the other. They were shipped in a car

Stop Losses from Insects

... Use the "ENTOLETER" Continuous Control System for Plant and Product Cleanliness

Operating records prove that "ENTOLETER" Continuous Control destroys all forms of insect life. In addition to this service, mills and food plants are reaping other benefits from the "ENTOLETER" system. Here are three positive advantages.

1 KILLS ALL INSECT LIFE

Now, more than ever, your plant and products need the "ENTOLETER" system of continuous insect control. It helps you to avoid waste of scarce food materials . . . to protect product ingredients . . . to insure the high standards of your products.

2 ESSENTIAL IN FRAGMENT CONTROL

The "ENTOLETER" system is being used successfully to reduce fragment count. Send for a copy of our latest bulletin describing methods of application.

3 AIDS PRODUCT UNIFORMITY

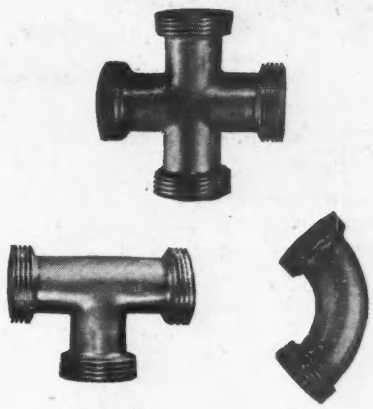
Food plants and flour mills have found that the "ENTOLETER" system offers an excellent means of blending flours, mixing ingredients in compounds and improving vitamin distribution. This, alone, more than justifies its cost.

For full information on "ENTOLETER" Continuous Insect Control System, write to ENTOLETER DIVISION, The Safety Car Heating and Lighting Co., Inc., P. O. Box 904, New Haven 4, Connecticut.

ENTOLETER
INFESTATION DESTROYER
REG U S PAT OFF

CONTINUOUS INSECT CONTROL SYSTEM

SANITARY STAINLESS STEEL FITTINGS



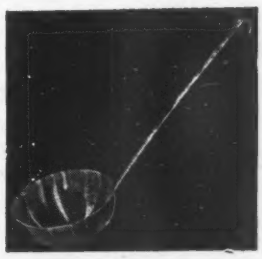
Eliminate unsanitary lines and bacteria pockets in your processing lines—install the new Sanitary Fittings and Tubing that gives you a smooth inside — Leak tight joints. Faster, easier installation and maintenance—longer fitting life—no frequent replacements.

Use Super Speed Tools for Erecting Sanitary Lines

Fittings Shipped From Stock

DIPPERS

72 oz. with 17" hooked handle. Also some one, two and four quart FLAT dippers.



PAILS

Seamless stainless steel. Capacities, 12 and 15½ quarts.

We carry a full line of filter paper. Also, Hose for all purposes. Send us a sample of your needs.

Immediate Delivery

CONSOLIDATED SIPHON SUPPLY CO., INC.

DEPT. F. 22-24 WOOSTER ST. NEW YORK CITY

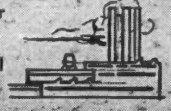
The Zenith Pulp Press, with capacity up to 26 tons per hour, thoroughly dewaters wet pulps and slurries such as:

Beet Pulp • Citrus Wastes • Tomato Pomace • Cherries • Corn Fibre • Paper Pulp • Reclaimed Rubber, etc.

Heavy screw-type spindle applies smooth, continuous pressure, forces pulp or slurry against selective resistance. Rifle drilled resistors permit use of steam when necessary. Minutely perforated screens assure efficient drainage, hold pulp losses to minimum. Ball thrust bearings and oversize shaft bearings reduce power load.

New uses for the remarkably efficient, profitable Zenith Pulp Press are being constantly developed. An experimental press is available for trial in your plant.

Write for full information.



JACKSON & CHURCH CO.
SAGINAW, MICHIGAN

along with crated oranges and oranges packed in bags. In a careful examination of each bag, upon their arrival in Detroit, A&P officials claim that not one orange was bruised or leaking juice. The test showed also that one handling was saved at the loading point and that handlings were saved from the receiving point to the store floor. It is estimated that a car can be loaded in one hour, using the bins, and unloaded in one-half hour.

The bins can be collapsed for return shipment, the freight charges being very little as compared with the indicated savings, according to those conducting the test.

Reveal Meat Exports For First Quarter

THE U. S. Department of Agriculture announced late in January that approximately 115,000,000 lb. of meat and meat products would be allocated for commercial export during the January-March period of 1947. Procurement of the meat will be made by foreign governments themselves through regular commercial channels.

The current quarter export allocation will be divided approximately as follows: United Kingdom and British Services Overseas, 25,000,000 lb.; France, French North Africa, and French Colonies, 23,000,000; Belgium, 16,500,000; Italy, 10,000,000; Netherlands Colonies, 14,500,000; Philippines, 6,000,000; Switzerland, 1,650,000; Sweden, 1,100,000; Finland, 3,300,000; Belgian Congo, 165,000; British Dominions, Colonies and Protectorates, 2,800,000; American Republics, 3,000,000; other commercial exports, 7,600,000.

The remainder of U. S. production for the period will be available for domestic consumers and for meeting reduced U. S. military requirements, which are not subject to specific allocation.

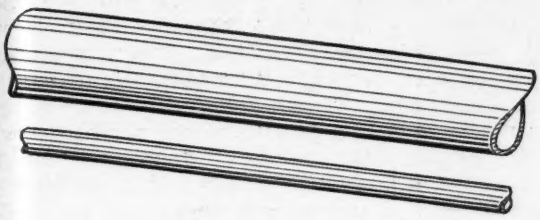
Court Invalidates Margarine Licensing

OLEO manufacturers as well as butter producers were deeply concerned in last month's ruling from the Pennsylvania Supreme Court, whereby license fees on wholesalers and retailers selling margarine were declared invalid. The ruling is by far the most important so far in the margarine industry's fight to outlaw restrictive regulations. The state's regulations on wrapping and marking margarine and prohibition of the sale of colored margarine were not affected by the ruling.

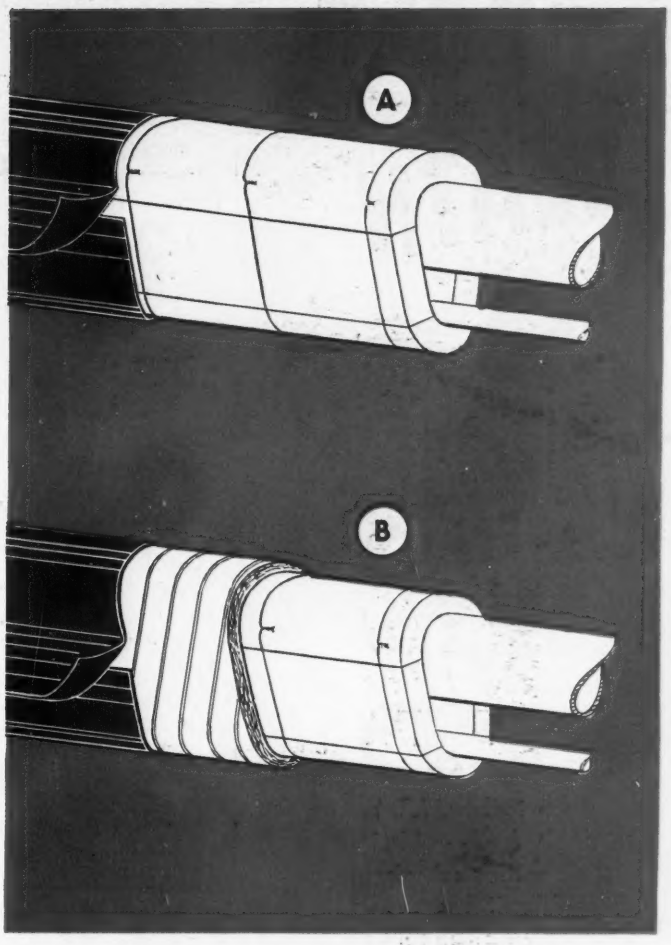
In addition to federal taxes and license fees, eight states impose excise taxes on margarine, ranging from 5 to 15 cents per pound; nine levy manufacturers' license fees; eleven have retailers' license fees; 23 prohibit the sale of colored margarine; 34 restrict the use of margarine in hotels, restaurants, bakeries and confectioneries.

PALLET BINS FOR CITRUS

These two steel wire pallet bins were recently used in a test shipment of oranges from Winter Haven, Fla. to Detroit. The oranges in bags showed no bruising or juice leakage. They cut down handling at both the shipping and receiving ends of the run.



How would YOU insulate these lines?



Here's the problem: A 4" line carrying a high-viscosity processing oil at 130° F. runs overhead from a heated outdoor storage tank across a factory yard to the processing operation. 1½" below it runs a 1" tracer line carrying saturated steam at approximately 15 lbs. pressure (250° F). The plant is located in the Great Lakes region. How would you insulate these lines?

A ☐ Half section of 85% Magnesia pipe covering on top of oil line and another on bottom of steam line. Join the pipe covering with 85% Magnesia block on both sides. All 85% Magnesia to be 1½" thick. Point up joints with asbestos cement and weatherproof

B ☐ Cover with 85% Magnesia as above, but use standard thickness. Then apply one layer of 1" hair felt and weatherproof.

Here's what the Armstrong engineer advised:

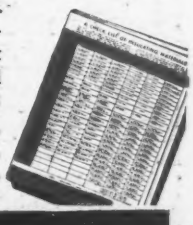
The problem is to maintain the viscosity of the process oil regardless of outside temperatures with a minimum use of steam. Therefore, the insulation must surround both pipes in such a manner that heat can be transferred from the steam line to the oil line. The installation is comparatively permanent and should serve for many years.

Both methods shown are efficient and lasting Under average service conditions, when winter temperatures do not drop below zero for any appreciable length of time, method (a) will prove entirely satisfactory. But in localities where sub-zero winter temperatures are common, extra precautions have to be taken to guard against thickening of the oil in a line. That's why the Armstrong engineer recommended method (b) for the job in the Great Lakes region. He knew that, while somewhat higher in original cost, extra insulating efficiency furnished by the one inch layer of hair felt would provide inexpensive insurance against production difficulties if the oil congealed in the line in extremely cold weather.

Sometimes it is possible for Armstrong engineers to point out sound methods of heat insulation that give you immediate savings. In other cases, such as this one, their thorough training and long experience indicate that it is better to spend a little more now in order to save larger sums in the long run. When you call in Armstrong's Contract Service—for a bid, for a complete job, or just for informal advice—you can count on getting recommendations that will genuinely serve *your* interest.

Free! New Insulation Chart

This chart lists types and thicknesses of insulation for temperatures from 300° below zero to 2800° F. Write for your copy today to Armstrong Cork Company, Industrial Insulation Dept., 4203 Maple Avenue, Lancaster, Pennsylvania.



ARMSTRONG'S INDUSTRIAL INSULATION

Complete Contract Service
For All Temperatures

From 300° Below Zero

To 2600° Fahrenheit

Roccal

Reg. U. S. Pat. Off. and Canada

BRAND

SANITIZING AGENT

Here is the revolutionary new sanitizing agent that meets Food Packers' needs . . . it's ROCCAL! A more powerful germ killer . . . yet perfectly *safe!* Easy to use. Economical. ROCCAL kills germs. It inhibits growth of molds, slimes and algae.

In recommended dilutions, ROCCAL is non-poisonous, virtually odorless and tasteless. It is non-corrosive . . . will not injure metal or fabrics. Does not irritate the skin.

Solve your sanitation problems today . . . get ROCCAL.

Sample and literature on request.

FOOD PROCESSING PLANTS

Keeps equipment and storage areas sanitary. Inhibits growth of molds and slime-formers.

COLD STORAGE AND LOCKER PLANTS

Reduces spoilage losses by keeping refrigerators and lockers sanitary. Does not affect odor or taste of food.

FISHERIES AND FISH PACKERS

For sanitizing storage areas of fishing boats and canneries, filet machines, shrimp deveiners, etc.

Industrial Division

WINTHROP CHEMICAL COMPANY INC.

Dept. W-37, 170 Varick Street, New York 13, N. Y.

New High Reached In Coffee Consumption

COFFEE imports into the U. S. during 1946, according to preliminary figures based on weekly reports of the U. S. Treasury Department, reached a total of 20,485,000 bags of 132 pounds each, George V. Robbins, President of the National Coffee Association, has announced. This means that the American people used 2,709,675,000 pounds of coffee last year. Translated into per capita consumption, the total indicates that over 19 pounds of coffee were consumed per person in the U. S. in 1946. Not even the Scandinavians, famed as heavy coffee drinkers, have approximated that record, their highest recorded per capita consumption being 16.5 pounds. The dollar value of these imports of green coffee reached a total of $466,951,000.

PROCESSING

Warn Oyster Canners On Standards of Fill

PACKERS of canned oysters were warned early in February that the standard of fill of container for canned oysters, promulgated in November 1944, could not be circumvented by packing large oysters in a manner that is "misleading." While the large oysters are not subject to the existing fill of container standard, it was pointed out that the substantive provisions of the Food, Drug and Cosmetic Act would be invoked if "water, brine, or liquid draining from oysters during processing, replaces a quantity of oysters which should be added to fill the can." Hearings to adopt definitions and standards of identity and standards for fill of container for all canned oysters will be called as soon as practicable.

Method Developed for Dehydration of Pears

A PEAR dehydration method that utilizes steam-blanching prior to sulphuring imparts superior texture and color to the product. Developed by E. M. Mrak, H. J. Phaff and R. L. Perry of the University of California, the method was successfully applied to part of the 1946 pear crop and will be put into commercial practice in 1947.

Dehydration steps include: (1) Grading of fruit for size and maturity before cutting in order to avoid uneven drying; (2) pre-sulphuring of freshly trayed halves

More than a Century OF MAKING VALVES ... and valves only

More than 100 years ago the Wm. Powell Company dedicated itself to the making of valves—*and valves only*. Thus Powell pioneered in the field of specialization long before the "age of specialization" arrived.

The soundness of this policy, backed by continual scientific advancement and the ability to meet every new demand as it has arisen, is attested by the high quality of Powell Valves today.

The Powell Line is so complete that there's a Powell Valve—*in Bronze, Iron, Steel, Pure Metals* or *Special Alloys*—to satisfy every known flow control requirement in every branch of modern industry.

Fig. 500—125-pound Bronze Gate Valve with screwed ends, inside screw rising stem, screwed-in bonnet and either taper wedge solid or double disc.

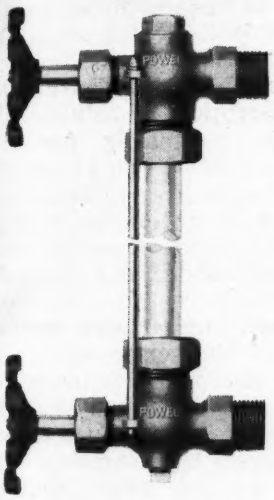
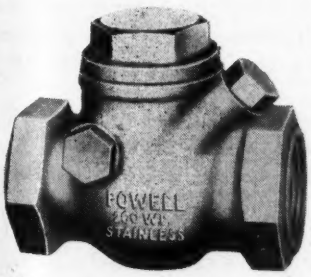
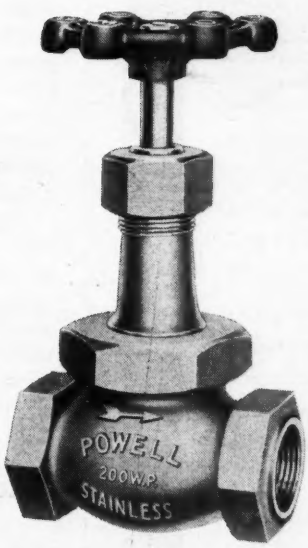


Fig. 884—Screwed end Liquid Level Gauge. Available in 3 sizes, in Pure Nickel, Stainless Steel and other metals and alloys.



200-pound Horizontal Swing Check Valve. Screwed ends, screwed-on cap and regrindable, renewable disc.
Fig. 1845—Pure Nickel.
Fig. 1847—Stainless Steel.



200-pound Globe Valve with screwed ends and union bonnet.
Fig. 1837—Pure Nickel.
Fig. 1861—Stainless Steel.

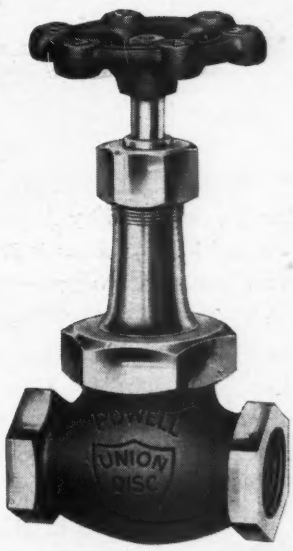
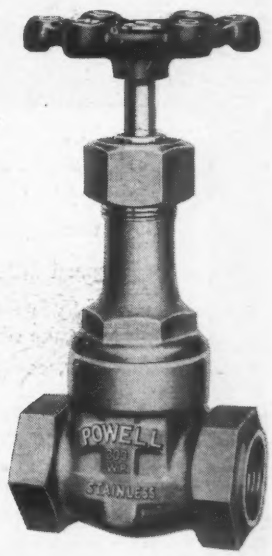


Fig. 150—150-pound Bronze Globe Valve with screwed ends, union bonnet and renewable composition disc.



200-pound Gate Valve with screwed ends, screwed-in bonnet and inside screw rising stem.
Fig. 1830—Pure Nickel.
Fig. 1832—Stainless Steel.

The Wm. Powell Co., Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

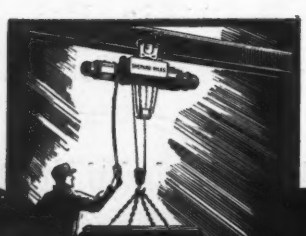
POWELL VALVES

Arms and Legs that never tire!

In heavy industry, loads to lift, move and deposit are reckoned in tons. No human muscles can endure such work day after day and year after year.

Shepard Niles electric cranes, made by America's oldest builder of electric cranes and hoists, are made in styles and sizes to take care of every heavy handling job—and to do it smoothly, easily, safely, economically and efficiently.

There's a type Shepard Niles crane to solve *your* handling problem. Trained, experienced Shepard Niles engineers, familiar with the requirements of thousands of crane users, will gladly study your needs and recommend, without obligation, the crane best suited to do your job.



A Shepard Niles crane of the right type will help you enjoy competitive advantages not possible without the best material handling equipment.

If your handling loads start with an eighth ton, why not look into the advantages of a Shepard Niles electric hoist? There are over 5,000 styles and sizes from which to select. There's one to fit your needs. Ask us to help you select it.

Shepard Niles
CRANE & HOIST CORPORATION

422 SCHUYLER AVE. • MONTOUR FALLS, N. Y.

NEW N. C. A. PRESIDENT

Emil Rutz became president of the National Canners Association, at its recent convention in Atlantic City. Mr. Rutz, who succeeds Fred A. Stare, is president of the Schukl Co., Sunnyvale, Calif.

for 20 to 30 minutes to set color; (3) steamblanching for about 20 minutes to retain translucency; (4) cooling before sulphuring to insure absorption of sulphur dioxide; (5) sulphuring for ten hours at a rate of two 12½-pound buckets of sulphur every five hours in a 4-stack house; (6) dehydrating to 30 or 35 percent moisture content in high air flow and moderate humidity to achieve rapid moisture removal and high sulphur dioxide retention. Since blanched fruit loses its moisture quickly in the dehydrater, wide spacing or staggering of cars in the tunnels is advisable to prevent high humidity.

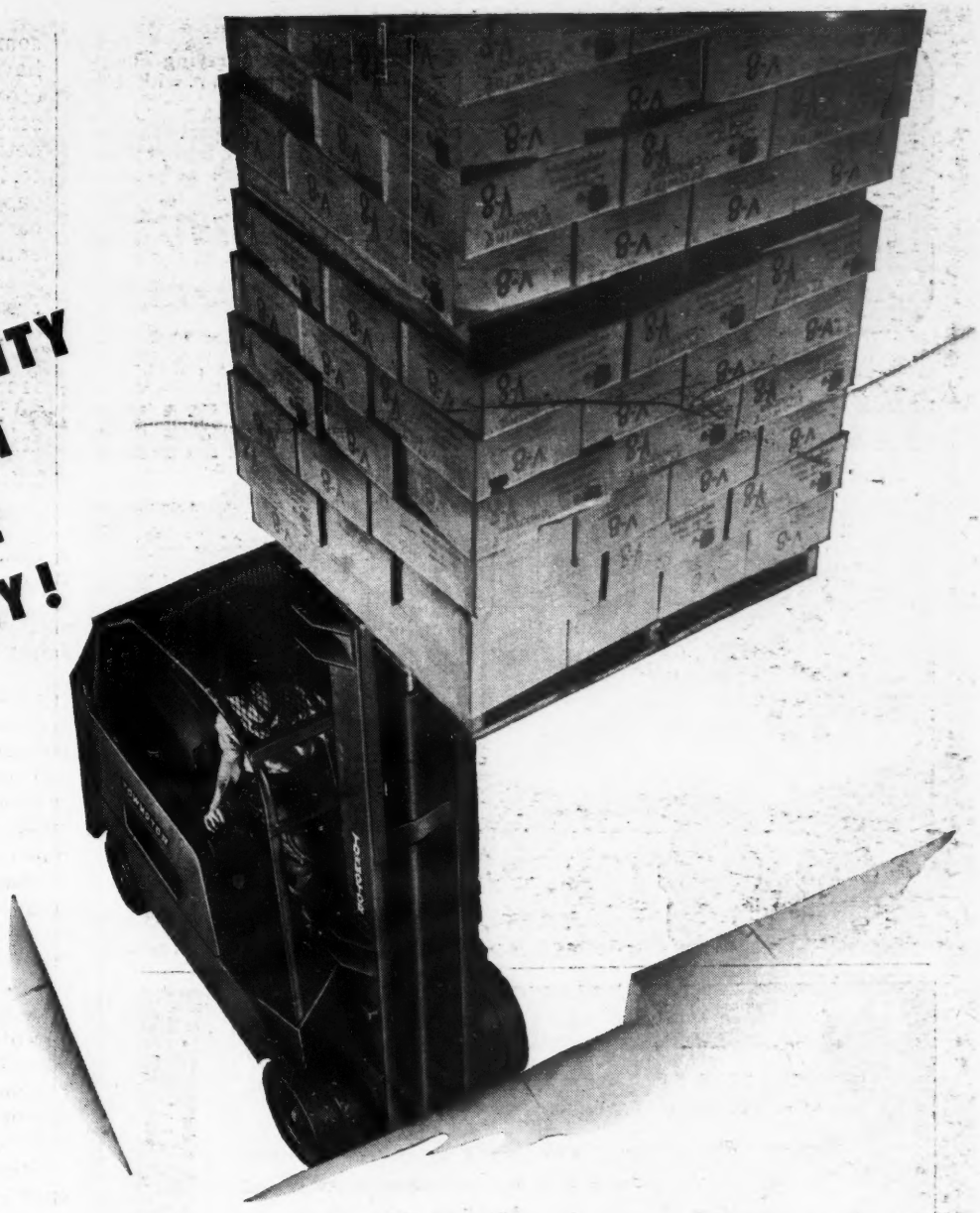
Steam-blanched pears require only 10 or 12 hours of sulphuring as compared to 36 or 48 hours for unblanched fruit. Only the best grade of flowers of sulphur can be burned successfully because impurities will form a smothering slag on the surface of the molten sulphur.

Study Cream Factors That Affect Butter

SUGAR CREEK CREAMERY CO., Danville, Ill., a division of National Dairy Corp. has established a $5000 two-year research program with the University of Nebraska Foundation.

The program is to cover a scientific study of factors affecting the quality of cream in butter making. It will include the production of cream on the farm, treatment on the farm, handling between the farm and processing plant and in the plant, and during storage and shipment as butter. Specific quantitative information is sought. For

THERE'S PLENTY OF ROOM IN THE BALCONY!



"Main floor" storage is expensive — especially when overhead storage space is wasted. In many operations, outmoded handling methods prevent full utilization of the existing storage area. In many other operations, Towmotor Fork Lift Trucks have doubled, even tripled, storage capacity through high stacking of materials and products.

Let Towmotor show you how to "pack the house," convert waste space into profitable warehouse space. First step? Send for a Pocket Catalog describing the complete line of Towmotor Fork Lift Trucks and Accessories.

SEND for special bulletins describing the **TOWMOTOR**

UNLOADER
UPENDER • SCOOP
CRANE ARM
EXTENSION FORKS
EXTENSION BACKREST
RAM • OVERHEAD GUARD

TOWMOTOR CORPORATION
Division 14, 1226 East 152nd St., Cleveland 10, Ohio

TOWMOTOR *THE ONE-MAN-GANG* **FORK LIFT TRUCKS *and* TRACTORS**

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

for • SPRAYING
• WASHING
• RINSING
• COOLING
• AIR CONDITIONING

Get the most out of your Spraying Equipment with minimum power . . . with efficient spraying.

Use Yarway Nozzles. No internal vanes or other restrictions to clog or hinder flow. Two types—Yarway Involute-type producing a fine hollow spray with minimum energy loss, and Yarway Fan-type producing a flat fan-shaped spray with time-saving slicing action for cleaning.

Wide range of standard sizes and capacities. Cast or machined from solid bar stock.

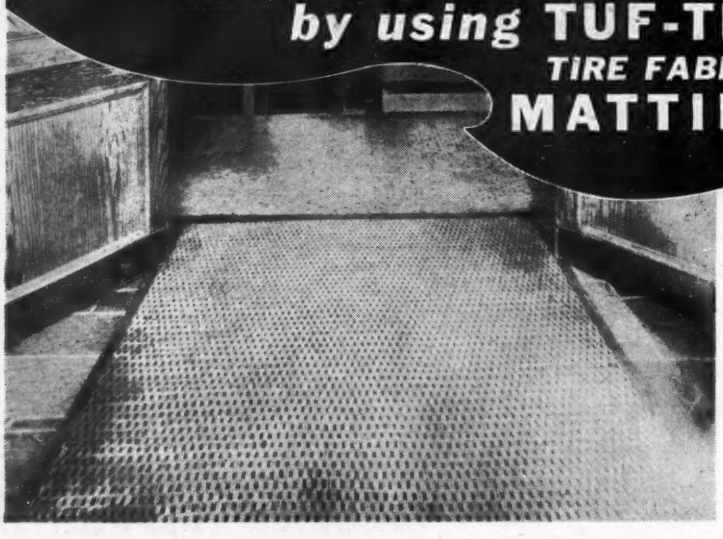
Thousands in use. Write for new Bulletin N-616.

YARWAY SPRAY NOZZLES

FAN-TYPE FOR FLAT SLICING SPRAY

YARNALL-WARING COMPANY
127 Mermaid Avenue, Philadelphia 18, Pa.

PREVENT ACCIDENTS
REDUCE FATIGUE
by using TUF-TRED
TIRE FABRIC
MATTING



around machinery, on wet floors and ramps, and in wash rooms. Long wearing. Beveled nosing on all sides. ⅝" thick, up to 6' wide, any length.

— also —

American Counter-Tred Matting
Ameriflex Hardwood Link Matting
"Walrus Hide" Roll Rubber Matting
Neo-Cord Counter Tred Matting
EZY-RUG Rubber Link Matting

For prices and folder "A Mat for Every Purpose" write

AMERICAN MAT CORPORATION
"America's Largest Matting Specialists"
1797 Adams Street Toledo 2, Ohio

some time butter manufacturers have known what happens when cream quality deteriorates. This study seeks to determine why the deterioration takes place, what bacteria are involved, why two creams subjected to seemingly identical conditions will be affected differently. Particular emphasis is to be placed on what happens to the cream before it gets to the creamery, which is subsequently reflected in the quality of butter made from it.

Informal Hearings On New Food Standards

THE FOOD Standards Committee of the Food and Drug Administration will meet in Washington, March 25, 26 and 27, to consider and make recommendations as to definitions of standards of identity for various salad dressings and certain frozen foods, as well as standards of quality and fill of container for canned corn.

The meetings, scheduled to be held in room 5545, Social Security Bldg., will open at 10 a. m., March 25, when mayonnaise, salad dressings, French dressings, and related products will be considered. The canned corn standards will be considered on March 26, and frozen fruits on the 27th.

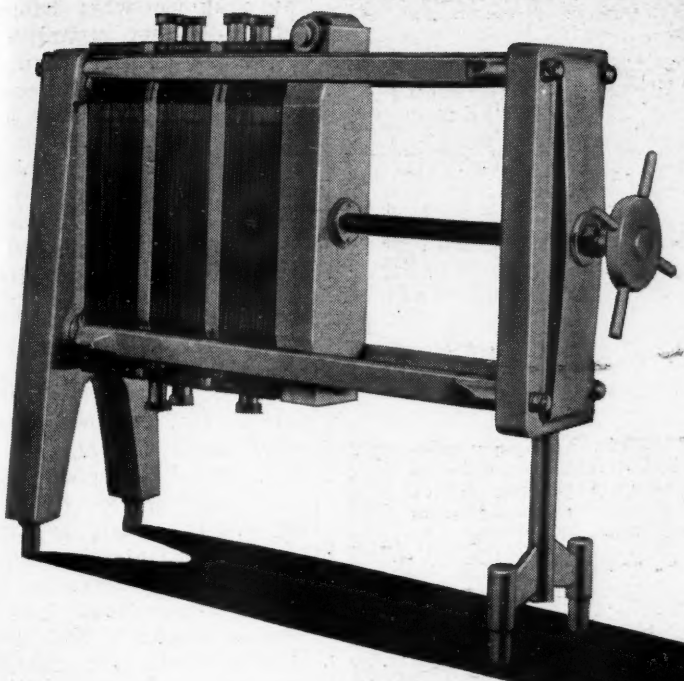
As an aid in considering the problems involved, the committee will be glad to receive recommendations, supported where possible by factual data, from members of the affected industries. Communications should be addressed to the Secretary, Food Standards Committee, Food and Drug Administration, Washington 25, D. C. These meetings are open and informal and are not to be confused with the formal hearings required under the law.

Fish Fillets

ATLANTIC COAST FISHERIES, Boston, has shipped one of its Hunt fish filleting machines (F. I. October, 1946) to the Hull Ice Co., Ltd., Hull, England, where it is scheduled to be demonstrated to the English fish industry for a three-month period.

Raw Milk Test

DETECTION of raw milk in various milk products is necessary for compliance and for inspection controls where state laws require use of pasteurized milk only. A new test has recently been devised by Bureau of Dairy Industry as a modification of the phosphatase test formerly used exclusively on



Available in all-stainless steel models for handling from 300 gallons to 4000 gallons of liquid per hour, according to type of operation.

Have you checked on Superplate?

■ As a food producer you stand to gain much by checking up on Superplate—the plate-type *all-stainless steel* pasteurizer.

Thoroughly proved and widely used, Superplate has established itself among leading food processors as a quality-improving, space-saving, time-saving money-saying production unit. It can heat, cool and regenerate at the same time: It pasteurizes continuously under rigid control: It is easily cleaned, highly sanitary, extremely simple in design. No mistake—Superplate is a "natural" for your plant, too. See your Cherry-Burrell representative or write your Cherry-Burrell branch office.

CHERRY-BURRELL CORPORATION

427 W. Randolph Street, Chicago 6, Illinois

Milk and Food Plant Equipment and Supplies

FACTORIES, WAREHOUSES, BRANCHES, OFFICES OR DISTRIBUTORS AT YOUR SERVICE IN 52 CITIES

Something New Under the Sun

. . . A UNIVERSAL COLLOID AGENT

IT THICKENS . . .

IT GELS . . .

IT EMULSIFIES . . .

IT STABILIZES . . .

IT SUSPENDS . . .

We are now producing from Carragheen two new improved types of gelose. One of them should be the answer to your emulsifying, suspending, thickening or stabilizing problems.

KRIM-KO GEL is an all-purpose colloid-assistant. Properly used, it has been proved effective in many of the most exacting food, pharmaceutical and industrial applications.

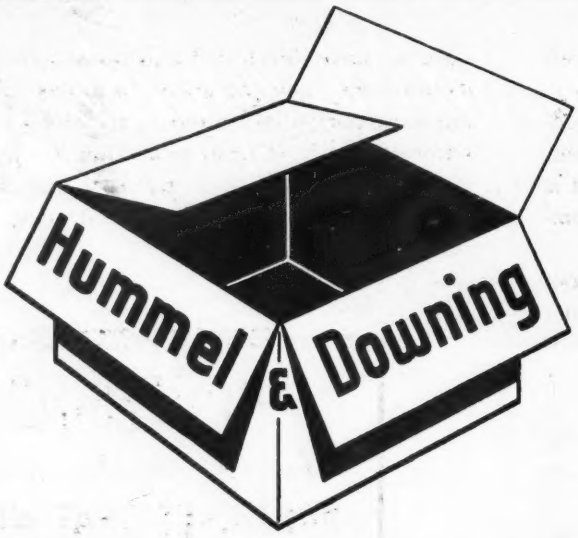
CARRAGAR is an agar-type gelatin which forms tender, fruit-like gels over a wide pH range. It does not require acidulation to produce desired results.

Send for free liberal working samples for experimental use.

KRIM-KO Corporation

SEAPLANT PRODUCTS DIVISION

NEW BEDFORD, MASS.



Rugged Solid Fibre and Corrugated Shipping Containers give effective protection to food products in transit and in storage.

Hummel & Downing Folding and Display Cartons preserve product quality and build sales.

HUMMEL & DOWNING COMPANY

MILWAUKEE 1, WISCONSIN

WASTE PAPER IS A VITAL RAW MATERIAL . . . SAVE IT

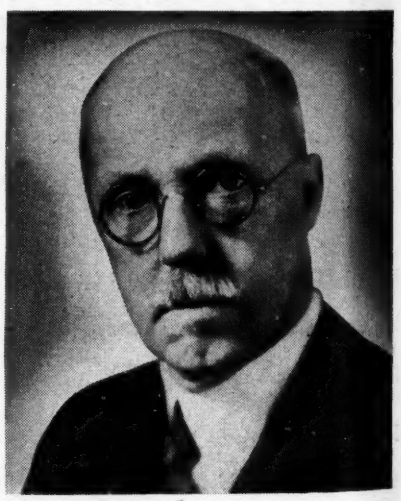
whole milk. It permits detection of as little as one part in 2,000 of raw milk when applied to the resulting cheese, regardless of the age of the cheese. In whole milk, cream, and other fluid products an even greater sensitivity is claimed. Slightly less sensitivity is found in use of the test on goat's milk and its products.

Standards Amended For Canned Sweets

U. S. STANDARDS for grades of canned sweetpotatoes have been revised by the Production and Marketing Administration of the Department of Agriculture. The revised standards cover three types of pack, including liquid packing medium, vacuum pack (without packing media), and "solid-pack" or "dry-pack". Only three grades are proposed, A or fancy, C or standard, and D or substandard. Styles may include whole sweetpotatoes, pieces of sweetpotatoes, or mashed sweetpotatoes, or any combination of two or more of those styles.

Specifically elaborated in the standards are paragraphs covering fill of container, drained weight, color, shape and size or consistency, defects, and character. Sirup density requirements are not incorporated as a factor in these grades.

A sample score sheet for canned sweetpotatoes is included as part of the publication in the Federal Register for February 13, Pages 1026 to



NOTED CHEMIST DIES

The distinguished career of Dr. Charles Albert Browne, 76, came to a close February 4, after more than a quarter of a century of research with the Department of Agriculture. His work in sugar chemistry is known throughout the world and his "Handbook of Sugar Analysis" is used as a standard in laboratories. Upon his retirement in 1940, Dr. Browne was appointed a collaborator with the USDA, which position he held at his death.

"Once a customer purchases Saratoga Vichy, we can safely rely on its advantages to speak for themselves. Satisfying quality plus sure identification mean repeat sales. Our labels must stay fast under all conditions. This means using the correct adhesive, and Arabol is just that. Arabol Adhesives have proved to be completely effective in the labeling of our bottles."

Arabol is pleased to receive this testimonial from Saratoga Vichy Spring Company, a firm whose product – carbonated water drawn from natural springs – is justly famous. We are particularly pleased with the statement that Arabol is the *correct* adhesive for these labeling operations, because it is our constant aim to provide every customer with the one best adhesive for each specific job.

As a result of this emphasis on individualized attention, we have developed and now have on file in our laboratories 10,000 adhesives formulas. When you submit your particular adhesives problems to Arabol, the knowledge gained from more than 60 years of success is at your service. Let us put that knowledge to work for you. See the Arabol Representative when he calls; he knows adhesive.

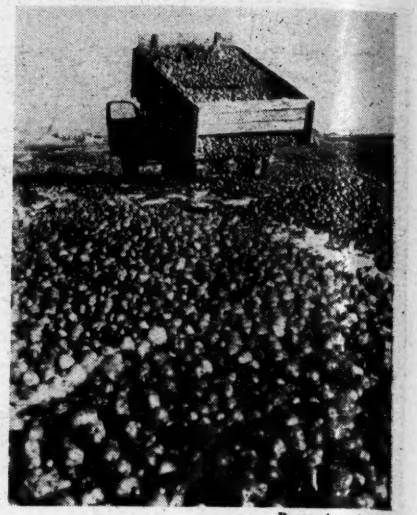
PIONEERING
in the making of
ADHESIVES THAT WORK

THE ARABOL MANUFACTURING CO.

Executive Offices: 110 East 42nd St., New York 17, N. Y. CHICAGO — 54th Avenue & 18th Street
SAN FRANCISCO — 30 Sterling Street • *Branches in Principal Cities* • *Factories in Brooklyn, Cicero, San Francisco*

Adhesives?... ARABOL!

Freshness
MAINTAINED
UNDER ALL CONDITIONS WITH
Steri Sealed
LINED STEEL
CONTAINERS
An exclusive Inland Steel Container product
Berries, preserves, fruits, jellies, syrups and foods of all kinds packed for shipment or storage maintain their original freshness and purity in Steri Seald Lined Steel Containers. Frozen foods freeze faster and thaw faster and have the complete protection against contamination or leakage that only a steel container can give. Steri Seald lined drums and pails represent the highest achievement in bulk packaging of foods.
No. 55188 Lever Locking Ring Drum
No. 584 Lug Cover Pail
No. 514X Lever Locking Ring Pail
No. 584R Swivel Spout Por-Pail
No. 594Q Closed Top Pail
INLAND STEEL CONTAINER CO.
Container Specialists
6532 S. MENARD AVENUE, CHICAGO 38, ILLINOIS
PLANTS AT: CHICAGO • JERSEY CITY • NEW ORLEANS



Press Association

FERTILIZER

Surplus potatoes, from the Red River Valley, ordered dumped by the federal government are here being spread over a field near Grand Forks, N. D.

1028. March 15 was set as the effective date when this revision supersedes the standards that have been in effect since August 1, 1934.

Publish Amendments to Canned Pea Standards

PUBLICATION of the amended paragraphs in the standards of identity for canned peas, to permit additional alkalies to be used, marked the last official action in a formal standards proceeding. May 12, 1947 is the effective date of the amendment, publication of which was in the Federal Register on February 11, Page 950.

This represents a period of just over four months from date of first notice, last October 1, to the promulgation of the administrator's order. The effective date adds another 90 days to this time, and preliminary arrangements with Food and Drug Administration prior to the announcement of the hearing occupied several weeks in addition, even though it was only for a very simple amendment to an existing standard. When an entirely new standard is to be formulated, the time required is usually considerably longer.

Alaska Fisheries

CHANGES in regulations for the protection of commercial fisheries in Alaska, during 1947, were issued by Secretary of the Interior J. A. Krug, January 24. The regulations, recommended by the Fish and Wildlife Service, are based upon scientific investigations as well as upon public hearings conducted in Alaska and in Seattle, Wash.

"There's C. J. talking his head off again about how much better Cerelose makes our products..."

TEXTURE
FLAVOR
QUALITY
STEPS UP

CORN PRODUCTS SALES COMPANY
17 Battery Place · New York 4, N. Y.

FABLE OF THE RAT

who didn't know his BISCUITS!

You're gazing at a picture of Mr. Rat enjoying his last banquet. It *looked* good, *smelled* good, *tasted* good, but what this predatory prowler didn't know about RODITE was—*to eat it, is to die.*

RODITE, you see, contains a special scent and flavor to entice rats—and a special extract of poison to kill them in an *entirely different way. Through paralysis of their respiratory system!*

The wonderful thing about RODITE is that not only will this ready-prepared cereal cracker lure rodents to their death more surely than ordinary rat poisons—but that it seldom leaves a trace of their foul carcasses on your premises to cause annoying odors and costly "rip-ups".

RODITE is relatively harmless to humans and other animals. Consult one of over 350 West Representatives, specially trained to solve your rodent problems.

Products That Promote Sanitation

WEST DISINFECTING Company

42-16 WEST STREET
LONG ISLAND CITY 1, N. Y.

★ BRANCHES IN PRINCIPAL CITIES OF THE UNITED STATES AND CANADA

CLEANSING DISINFECTANTS • INSECTICIDES • KOTEX VENDING MACHINES
PAPER TOWELS • AUTOMATIC DEODORIZING APPLIANCES • LIQUID SOAPS

RAW MATERIALS

IEFC Expects Another Export Grain Shortage

WORLD exportable supplies of rice will be more than 5,000,000 tons short of the import demand during the coming crop year, according to D. A. Fitzgerald, secretary-general of the International Emergency Food Council. The statement appeared in the report to the third meeting of the council. This piles an additional burden on the supply of other cereals, the report added, since it leaves only 24,000,000 tons of cereals to satisfy requirements of 38,000,000 tons. Last year, 25,500,000 tons of cereals had to be rationed to a demand for 34,000,000 tons.

With the grain shortage continuing, IEFC could foresee little improvement in the European meat shortage, which is now one-third the prewar supply. Only about 3,300,000 tons of export fats and oils are in sight to satisfy a prewar demand of twice that.

On the brighter side the report declares that never before have so many nations cooperated with such a degree of success in the solution of the hard problems of daily living. The report also points to the necessity for a decision as to the disposition of IEFC activities after December 31, when the council is scheduled to expire. It is evident in the report that the shortage of basic foodstuffs will not be over by the end of the year.

Press Association

CAKE FROST

These cakes and pastries couldn't possibly taste as good as they look, but this Chicago lad is willing to make the test. We suspect collusion in the clearing of that nice square space for him to peer through at one of the city's bakeries.

Now let's look behind the adjectives

It takes more than mere words to make profits in the food industry. Forward-looking business men demand concrete facts.

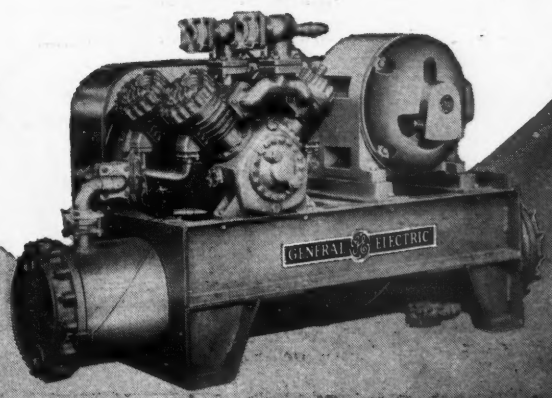
That's why your General Electric distributor or contractor will be glad to show you exactly *how* General Electric Condensing Units cut operating costs . . . give high capacity with low power consumption . . . stand up under years of constant use.

General Electric's production of refrigeration condensing units of medium and large size for the food industry is increasing rapidly. Your General Electric distributor can help you plan to use this equipment for profitable operation.

So see your General Electric Distributor or Contractor *today*. He's listed under "Refrigeration Equipment" in your Classified Telephone Directory. *General Electric Company, Air Conditioning Department, Section 7893, Bloomfield, N. J.*

GENERAL ELECTRIC

MAKE A GENERAL ELECTRIC CONDENSING UNIT THE HEART OF YOUR REFRIGERATION SYSTEM



SPICEOLATES

THE BETTER SPICE FLAVORS

D&O

Spiceolates have many advantages — and can be used not only to extend your supplies of natural spice oils, but also as complete replacements for them. Spiceolates are very soluable in water and remain in good condition indefinitely under most any circumstances.

DODGE & OLCOTT, Inc.

180 VARICK STREET, NEW YORK 14, NEW YORK

Boston · Chicago · Philadelphia · St. Louis · Los Angeles

Plant and Laboratories, Bayonne, New Jersey

WRITE US TODAY FOR YOUR COPY OF OUR NEW SPICEOLATE FOLDER

STOP COSTLY LEAKS!

SEAL PIPE JOINTS *with* KEY-TITE

Pipe joints once sealed with Key-Tite do not leak, yet they can be easily opened because Key-Tite does not freeze the connection. It contains no lead nor lead substitutes and does not affect the taste or odor of potable liquids. Key-Tite prevents leaks on all lines carrying water, gas, low-pressure steam, compressed air, etc.

Send for Free Sample — test Key-Tite in your own plant at no cost to you.

KEY Company

2616 McCasland Ave., East St. Louis, Illinois

38

AIR FISHING

This tuna clipper put to sea early in January, carrying a light pontoon airplane lashed to top of her bait tank. The plane will be used to scout schools along the Mexican and Central American coasts.

Australia Expanding Pineapple Production

A COUPLE of Guiana pineapples, which enterprising British botanists saved from the slicing knife 100 years ago, have brought another bonanza to the Australian sugar state, Queensland.

Queensland pineapple growers are cooperatively financing a giant cannery designed to process 20,000 tons of fruit annually. The plant covers a floor space of 125,000 square feet and involves a cost of £330,000 (about $1,100,000), nearly equaling the capital value of all other existing canneries, which is £400,000.

Like most of the world's sugar producing areas, Queensland is excellently suited to the cultivation of pineapples. However, it was only in comparatively recent years that canning of pineapples was established as a large-scale industry.

March Grain Exports Allocated by USDA

EXPORT allocations of 1,500,000 long tons of wheat, flour (in wheat equivalent), corn, grain sorghums, and barley have been announced by USDA for March. This is the largest tonnage scheduled for any month since the beginning of the postwar grain export program in the summer of 1945. Export allocations for February 1947 were 1,204,500 long tons.

The March allocations of 1,500,000 long tons consist of 494,000 tons of wheat, 434,000 tons of flour in wheat equivalent, 489,000 tons

SAFETY FOR SENSITIVE PRODUCTS: Rustproof and corrosion-resistant, these long-lasting Inconel pails assure top protection against metallic contamination. Made and stocked in 12-14-16-20 quart sizes.

Ordinary pails? Not by a long shot!

They're in a class by themselves.

They stay bright and clean. They stay smooth and sturdy. They put an end to metallic contamination of sensitive food products. And they'll be on the job long after ordinary pails have hit the scrap heap.

Why?

Because they're made of solid Inconel*, the corrosion-resistant Nickel Chromium Alloy that handles not only brines, fruit juices and vegetable acids, but stronger acids, alkalies and organic chemicals as well.

Easy to clean and keep clean, Inconel—like all high Nickel Alloys—can never rust. It's the same all the way through. There's no coating to chip or crack, nothing to wear away. And it has the strength and toughness to take plenty of slamming around.

Durable, all-welded Inconel pails are made by the ALLCRAFT MANUFACTURING COMPANY, INC. Because of their long life, ALLCRAFT Inconel pails are the most economical you can buy; the protection they afford against metallic contamination makes them the safest you can use.

*Reg. U. S. Pat. Off.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

INCONEL
. . . PROTECTS PRODUCT PURITY

FOR FURTHER INFORMATION—MAIL COUPON

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

Please tell me where I can obtain ALLCRAFT *Inconel pails.*
I am interested in ☐ Plain Inconel pails
☐ Sanitary Inconel pails for foodstuffs

Name.....

Company.....*Title*.....

Address.....

City.....*Zone*.....*State*.....

F.I.-3-47

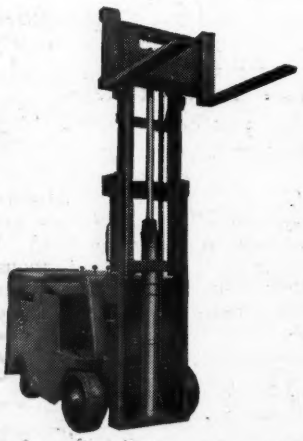
HE BUILDS A NEW WAREHOUSE WITH EVERY LOAD

"IT WAS just like finding 30,000 square feet of warehouse space when we replaced our old lift truck with a new Crescent electric PALLETIER," a factory superintendent told us. "The space was up there between our old stacks and the girders of the roof. So for the cost of a Crescent PALLETIER we practically built a new 30,000 foot warehouse."

The Crescent PALLETIER can help you find extra storage space—high above the floor—right in your own warehouse. The space is free . . . for the cost of the PALLETIER is quickly offset by lowered materials handling expenses. Write for the PALLETIER bulletin today.

CRESCENT TRUCK COMPANY
1130 Willow St. • Lebanon, Pa.
Member Electrical Industrial Truck Association

This is the truck to take loads off your mind.



PALLETIER FEATURES

- Operator spots and tiers without stirring from seat
- All control levers at driver's fingertips
- Full magnetic control protects against forced acceleration
- Inspections and adjustments simplified by easy accessibility to all mechanisms
- Minimum maintenance costs

ELECTRIC Crescent PALLETIER

of corn, 51,000 tons of grain sorghums, and 32,000 tons of barley. The March allocations of flour include a proportion of the quantities which had been announced in December for 10 of the countries now under export license, covering the January-March 1947 quarter.

All wheat programmed under the March allocations with the exception of quantities going to Mexico and small quantities for other Western Hemisphere countries will be supplied by PMA. All other grains, excepting quantities for UNRRA and United States occupied zones, will be supplied through commercial procurement. Flour for UNRRA and United States occupied zones will be supplied by PMA; most of the flour for other claimants has already been procured through trade channels.

Spinach Decreased

SPINACH processors in California and Texas apparently are planning a reduction of about 19 percent from the 1946 plantings in the acreage to be planted for canning and freezing in 1947. A total of 12,890 acres is in mind for processing this year compared with 15,990 acres planted in 1946 and 16,730 acres for the 1936-45 average.

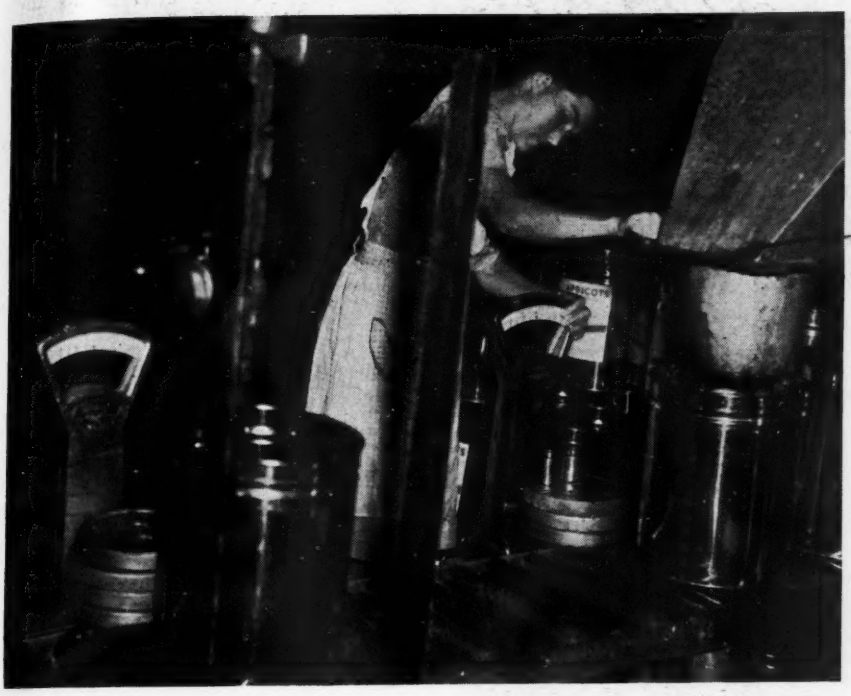
California processors intend to plant 7,890 acres for 1947, which is 28 percent less than the 10,990 acres planted in 1946 and also the 10-year average. In Texas the probable acreage for 1947 is the same as was planted in 1946 but is 13 percent less than the 1936-45 average.

Press Association

FISH APLENTY

This fish pier in Boston was jammed one day last month, as fish were unloaded from 43 vessels that put in unexpectedly with more than 2,000,000 lb. of sea food. Prices for cod and haddock dropped to five year lows, cod bringing 3 cents, haddock 5 c lb.

Filling Apricots for Freezing into 30 Pound Tins . . .



Filling apricots for freezing into 30 lb. tins. EXACT WEIGHT Scales in the Chapman Dehydrator Co., Modesto, California.

do it the Exact Weight Way...

You can package the institutional size container to fraction-ounce accuracy in the same manner as small consumer packages. The only difference is heavier capacity weighing equipment. Pictured above is an apricot operation filling 30 lb. tins with high speed, end tower EXACT WEIGHT Scales of adequate capacity with roller conveyor equipment. This method is not only very sound indeed but highly efficient and accurate in volume output. There is a EXACT WEIGHT Scale for every food operation. The only thing is which scale best fits your particular operation. A new food folder has just been printed. Write for a copy today. No obligation whatever.

EXACT WEIGHT Scale (Model #233) Tu-way vision tower, compact (fits into any sound food production line.) Weighing platter or scoop to specifications of the operation. Dial 1 oz. over and underweight by ½-oz. graduations. Capacity to three pounds.

INDUSTRIAL PRECISION
Exact Weight Scales

THE EXACT WEIGHT SCALE COMPANY
21 W. Fifth Ave., Columbus 8, Ohio
Dept. T, 783 Yonge St. • Toronto 5, Can.

? ARE YOU PACKING AIR ?

IF you are not packing the maximum amount of material into your containers, part of your container costs are being spent to enclose useless air.

Vibrox Packers provide a most efficient means of agitating the material in the container so that excess air is displaced and a maximum amount of material can be contained in a minimum amount of space. Vibrox Packers not only save on container costs but they also cut down on packing time and save labor. These combined savings frequently result in a Vibrox Packer paying for itself in 60 to 90 days time.

NO. 41
FOR PACKING 100 TO 750 POUNDS

Standard Vibrox models are available for packing bags, barrels, boxes, cartons, drums, and kegs. Weight ranges are 5 to 15 lbs., 15 to 75 lbs., 75 to 150 lbs., and 100 to 750 lbs.

Investigate the savings possible with the use of Vibrox Packers.

Gump Engineers, backed by 75 year's experience in the field of processing dry, flaked, granular, and powdered materials, will be glad to work with you in selecting the Gump-built equipment best suited to your specific requirements.

75TH YEAR

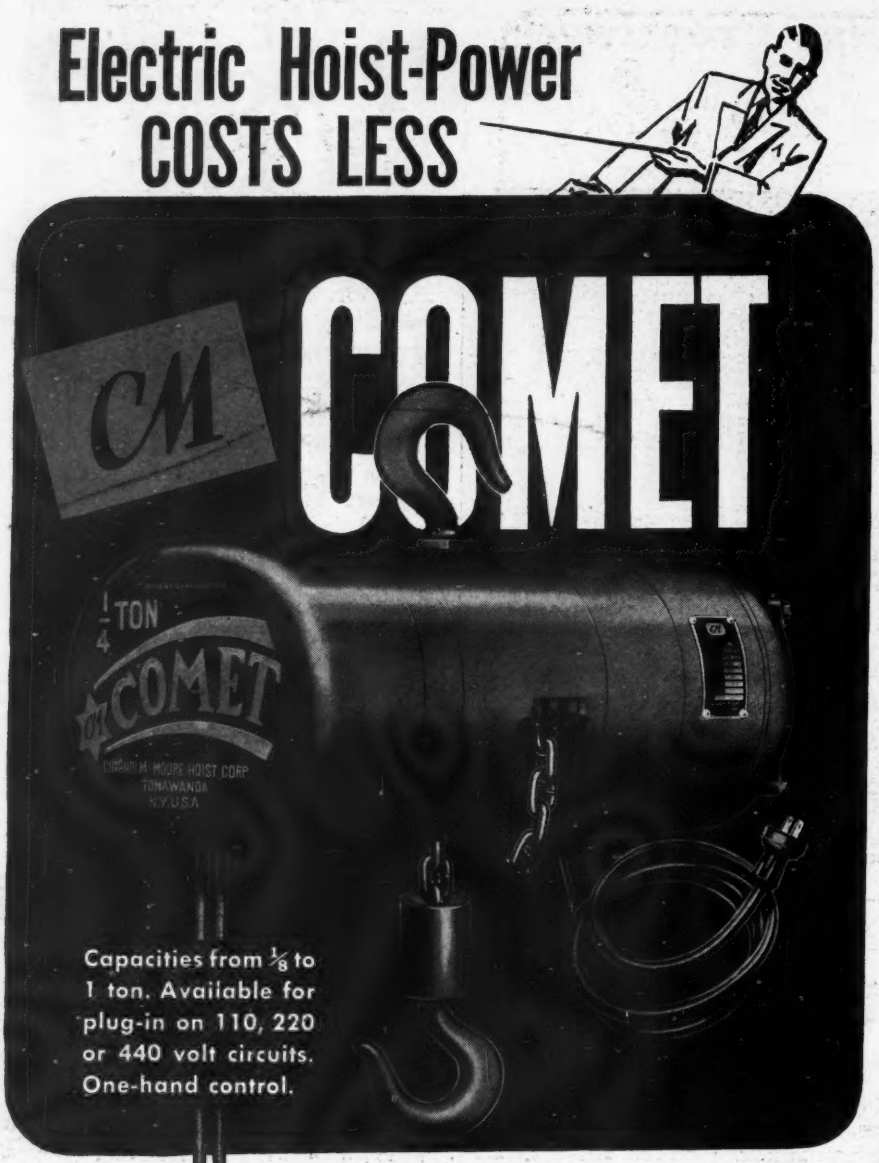
B. F. GUMP CO.

Established 1872

454 South Clinton Street • Chicago 7, Illinois

MAKERS OF: *Equipment for Grinding, Sifting, Mixing, Feeding, Packing and Weighing of Dry Food Products.*

Electric Hoist-Power COSTS LESS



Capacities from 1/8 to 1 ton. Available for plug-in on 110, 220 or 440 volt circuits. One-hand control.

- ECONOMICAL
- PORTABLE
- SPEEDY
- STURDY

Manual handling of materials is inefficient . . , more so today than ever before. The CM Comet makes substantial savings in materials handling costs . . . is doing it every day in thousands of plants. Possibly the CM Comet can save a good many dollars for you too. Check up on the materials handling situation in your plant. CM Bulletin 138 . . . available for the asking . . . will bring you complete details about the Comet.

CHISHOLM-MOORE HOIST CORPORATION

(Affiliated with Columbus-McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York • Chicago • Cleveland • San Francisco • Los Angeles

Cocoa Products

BECAUSE of continuing short world supplies, International Emergency Food Council has continued recommendations for allocations of raw cocoa beans, cocoa butter and unsweetened chocolate couverture for the remainder of the marketing year which ends September 30. This action was not unexpected. Allocations for the first four months of the marketing year have already been made.

India Tea

REPORTS from abroad notwithstanding, the Indian government is giving no sign of reversing itself with regard to the termination of the exclusive tea purchase contract with the British Food Ministry. Latest proof that the market will be a free one from now on, with highest bidders getting the Indian tea crop, is the government's decision to take some of the profits itself in the form of an export duty. The tax, at the rate of 2 annas (roughly 4½ cents) per lb. is expected to bring $13,500,000 into the government coffers annually.

SCHEDULE OF EVENTS

March

3-8—State College of Washington, Institute of Dairying, Pullman, Wash.
10-13—American Society of Bakery Engineers, 23rd annual meeting, Edgewater Beach Hotel, Chicago.
19-21—National Assoc. of Frozen Food Packers, annual convention and exposition, Public Auditorium, San Francisco.
31-Apr. 4—Frozen Food Institute, annual convention, Copley-Plaza Hotel, Boston, Mass.

April

8-11—American Management Association, 16th annual packaging exposition and conference, Convention Hall, Philadelphia.
10-11—Tri-State Packers Assoc., spring convention, Lord Baltimore Hotel, Baltimore, Md.
14-16—National Fisheries Institute, annual convention, Waldorf-Astoria, New York.
29-May 1—Industrial Packaging Engineers Assoc. of America, second annual industrial packaging and materials handling exposition, Sherman Hotel, Chicago.

May

6-10—The Society of the Plastics Industry, 2nd national plastic exposition, Coliseum, Chicago.
6-7—Millers National Federation, 45th annual convention, Edgewater Beach Hotel, Chicago.
12-16—Society of American Bacteriologists, 47th annual meeting, Philadelphia.
19-23—American Association of Cereal Chemists, 32nd annual meeting, Hotel President, Kansas City, Mo.
26-28—Flavoring Extract Manufacturers Assoc., annual convention, Traymore Hotel, Atlantic City, N. J.
26-28—American Society of Brewing Chemists, annual spring meeting, Hotel Roosevelt, New York.
26-29—National Confectioners' Assoc., convention and exposition, Hotel Stevens, Chicago.

Changes in Food Supplies

(Indicators)

Storage

Frozen fish and shellfish stocks declined 5,633,360 lb., during December, and on January 1 totaled 152,852,668 lb. This was 9 percent above holdings on the same date in 1946 and 40 percent above the five-year average for that date. It was estimated that the February 1 total holdings would be between 125- and 130,000,000 lb.

Stocks of tomato juice and tomato juice cocktail in canners hands on January 1, totaled 11,503,000 cases on a 24/2 basis. This compares with 7,432,000 cases held on January 1, 1946.

Lard output in December came to 156,243,000 lb., which was a sizable drop from the 177,792,000 lb. produced in November.

Production

Creamery butter made an unusually sharp gain in December, the estimated 88,810,000 lb. being 9 percent above November. The average November-December increase for the five year, 1940-45, period was 6 percent.

American cheese production in December, estimated at 50,745,000 lb., declined 2 percent from November. This compares with a 7 percent decrease for December, 1945, while the five year average November-December change shows an increase of a fraction of one percent.

Ice cream production for December, estimated at 37,690,000 gal., was a drop of 14 percent from November, which compares with the five year seasonal decline of the same percentage. The 1945 decline, however, was 21 percent. December production, nevertheless, was 60 percent above the five year average for the month. Production for the year, estimated at 740,470,000 gal., compares with the previous annual record of 475,009,000 gal. in 1945.

Canned evaporated milk production, during 1946, is estimated at 3,081,550,000 lbs., a decline of 18 percent from 1945.

Condensed milk production was 112,880,000 lb., in 1946, a decrease of 22 percent from 1945.

Spray and roller processed nonfat dry milk production reached 35,100,000 lb., in December, compared with 32,282,000 lb. a year ago. Production for the year came to 638,260,000 lb., 1 percent under 1945.

Dry whole milk production, in December, showed a heavy seasonal increase of 46 percent from November. The estimated output of 11,045,000 lb. exceeded the five-year average for the month by 47 percent, but was 6 percent below December, 1945.

Liquid egg production of 14,400,000 lb., in December, compared with only 1,240,000 lb. produced in December, 1945. Dried egg production came to 3,514,000 lb., far ahead of the 183,000 lb. produced in December, 1945. Frozen egg production was the second largest for December on record, reaching 2,750,000 lb.

Poultry canned, or used in canning, came to 8,751,000 lb., in December, which compares with 7,960,000 lb. used in December, 1945 and 12,852,000 lb. for December, 1944.

Flour production, for January, is set at 17,752,107 sacks in the Northwestern Miller's compilation, which represents mills producing about 69 percent of the 1945-46 output. This was an increase of 728,284 sacks over the previous month and compares with 16,845,636 sacks produced in January, 1946.

Macaroni production, in 1946, was 1,107,221,450 lb., as compared with 1,069,275,061 lb. in 1945. The 1937-41 prewar average was 677,614,107 lb., according to Glenn G. Hoskins.

Indexes

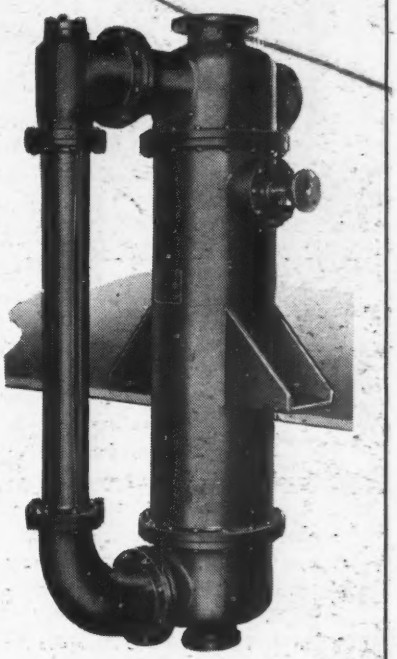
The commodity price index on food, compiled by the New York Journal of Commerce, was 187.4 for the week ending February 14. This compares with 179.2 for the previous week, 180.3 a month ago, and 110.6 for February, 1946.

Business Week's index of business activity stood at 190.5 for the week ending February 8, 190.7 for the preceding week, 189.9 a month ago, and 146.5 a year ago.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded February (thousands)	Total Awarded 1947 (thousands)
Bakery	$1,643	$812	$2,008
Beverages	4,565	265	1,274
Canning and Preserving	960	130	130
Cold Storage	765	808	998
Confectionery	.....	449	449
Grain Mill Products	100	200	885
Ice, Manufactured	.....	.....	.....
Meats and Meat Products	1,400	.....	175
Milk Products	755	152	1,328
Miscellaneous	2,769	638	2,150
	$12,957	$3,454	$9,397

STEAM JETS
for
Serving Vacuum Evaporators



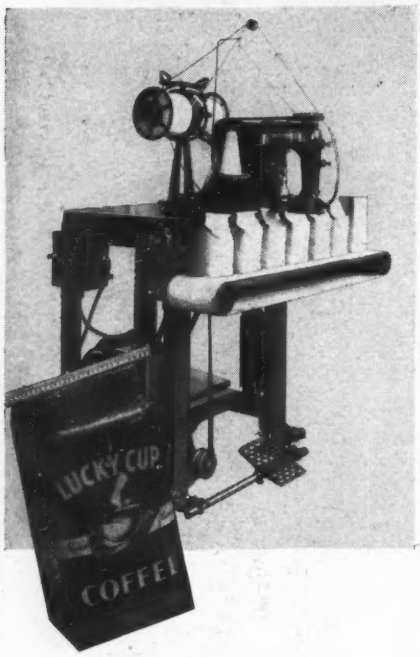
Whenever low absolute pressures are needed in evaporators and vacuum pans, Steam-Jet Ejectors provide a simple, reliable method of evacuating non-condensibles from the system. Whether it is milk evaporation, vitamin extraction, solvent recovery or one of the many other processes requiring a vacuum, Ingersoll-Rand engineers can recommend the ejector equipment that is best suited to every evaporator service.

Ingersoll-Rand

11 Broadway, New York 4, N. Y.

4-873

for closing
PAPER BAGS



Where food products are packaged in paper bags—from 1 lb. to 25 lb. size—the closure should be firm, tight, eye-appealing, inexpensive and easy to open. The ideal closure is the Union Special *"Dubl-Tape"* Closure. Producing this closure is the final step in mechanized packaging and can best be done with the Union Special 60000 D sewing head. Mounted on the popular Style 21800 N portable, table-type, bag closing machine, this is considered *essential equipment* by many producers of dry foods. Style 21800 N machine includes a power-driven conveyor adjustable vertically to accommodate different sizes of bags. Control is by floor treadle and the unit may be operated from a sitting position. Ask for recommendations on your particular problems. Literature on request. UNION SPECIAL MACHINE CO., 450 N. Franklin St., Chicago, Ill.

Union Special
Bag Closing Machines

What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

HOW TO ESCAPE—Congress and executive departments are both struggling with numerous problems as they undertake to eliminate wartime controls and wartime emergency relief arrangements. Far too many benefits, granted for emergency reasons during the war, have now assumed almost the proportions of vested rights. Neither economic nor technical argument sways many political decisions in such cases, when organized groups of society become ardent in addressing their congressmen.

NATHAN MIRAGE — Robert R. Nathan told C.I.O. that wages could be raised 25 percent without raising prices to consumers. That fantastic conclusion has been completely discredited, especially by the criticism of other labor groups. Proving Nathan's vision to be merely a mirage has not chartered the oasis where industry and labor can live together comfortably. Food technologists can demonstrate, however, that labor saving devices may permit higher hourly wages for sincere skilled workmen without overall cost increase. The difficulty is that machinery and other facilities for mechanization remain unobtainable in most cases. And Washington aggravates the problem by continuing extravagant veterans preference rulings.

PARITY NONSENSE—Parity prices for farm products are generally defined in terms of price relationships of more than 30 years ago. Technologic changes have occurred in those years. Hence, some parity prices are now absurdly high, encouraging excessive farm production. Others, in which cost of production had gone up relatively, are not adequate to give relief intended by Congress. The Department of Agriculture would like to rewrite the parity definitions on numerous commodities. But only those who would get a higher parity price by rewriting encourage the idea. Thus it is a question whether Congress will be able politically to achieve much of a modernization of the parity definitions. It almost certainly will not unless it is accomplished this year, for legislation unpleasant to large farm groups is almost certain to fail in 1948, an election year.

CHIDED GENTLY—More serious effort by hungry nations to grow more of their own food needs has been suggested in recent FAO and IEFC discussions. The British have taken the lead in this. Far too little emphasis has apparently been given by American spokesmen. If the United States does not want to be Uncle Santa indefinitely, something will have to be done more vigorously to get more home grown food in much of the world.

SUGAR ROUTING—Much more sugar is available per capita this year. The Washington problem is to find proper routing from refinery and sugar mill to the home kitchen. Self-appointed spokesmen of housewives have argued for bigger rations via sugar stamps. No one has yet been very successful in showing that often the housewife gets more relief by increased food-factory use of sugar. There remains the problem of proving that cake mixes, pudding mixes, and other dessert preparations from the food factory may help the housewife more than the equivalent sugar in her kitchen for home-made desserts.

ATOMIC TRACERS — Radioactive phosphorus will be included in small lots of fertilizer to be used experimentally in tracing the movement of that plant food in the soil and in the crops grown on treated land. This project supported by National Fertilizer Association parallels other experienced work with radioactive elements made from atomic energy fission piles. It is thought that some similar work in the biological field will result if Atomic Energy Commission establishes the proposed atomic energy laboratory near Washington under the joint auspices of Public Health

CHANGE OF ADDRESS

DIRECTOR OF CIRCULATION, FOOD INDUSTRIES
330 WEST 42nd STREET, NEW YORK 18, N. Y.

Please change the address of my Food Industries subscription.

Name .....

Old Address .....

New Address .....

New Company Connection .....

New Title or Position .....

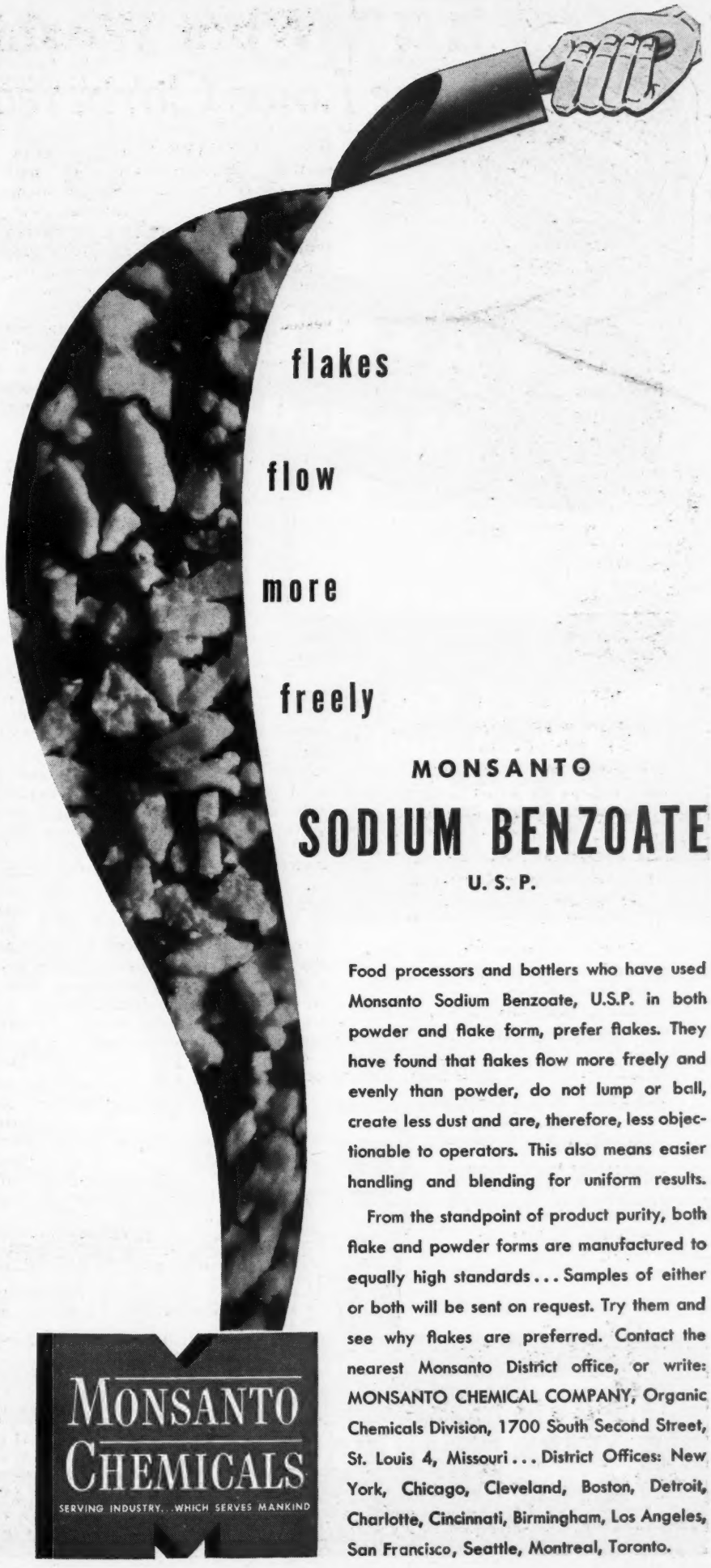
Service and National Bureau of Standards. Nutritionists wishing to make comparable studies with active tracer elements could undoubtedly be supplied with necessary material from some of the government laboratories if an acceptable joint research program were set up.

FOREIGN WANTS—Food industries of America have been experiencing difficulty in getting certain scarce raw materials from abroad. Some of this difficulty was war-bred only. Other scarcities were caused by foreign cartels or foreign government control of distribution in the world trade. These controlled items might perhaps be less limited if the State Department made a sincere effort to secure assurances of supplies for American enterprise. The international meeting at Geneva, which begins in April, will be an appropriate occasion for the State Department to make such effort. Education of the department as to the need, and perhaps some political persuasiveness, will help stir such effort.

COMPETING FERMENTABLES—Almost all controls are now off raw materials supplied for the fermentation industries. Corn and molasses are no longer subject to detailed distribution under schedules fixed in Washington. Planning is now possible at the technologic level, at least whenever the purchasing agent can find what the technologist wants in the quantities needed. Incidentally, this may again make feasible better quality guarantees on fermentation products, as well as better economies in the factory operation.

TAX ESCAPE—A political controversy of major magnitude may develop in the 80th Congress over questions of taxation on cooperatives. Those agencies are now of increased competitive importance in many lines of business, perhaps most importantly in sale of agricultural materials and purchase of goods for farmers. Privately-owned enterprise is arguing that the escape from taxation offered to some such groups is destroying opportunity for individual commercial effort.

CONTROLS HOW LONG—Authority for many controls will end on March 31. No one expects a general continuance of the authority for blanket controls. But controls for a few commodities and a few price levels seem likely, in the opinion of some of the most conservative and experienced officials. Rent control seems almost certain. Commodity control on sugar is probable. Several other things, like tin and rubber, may need management from Washington to prevent a stampede at the end of the control period. All the forecasts beyond this, and perhaps even these, are not much better than guesses, or hopes.



MONSANTO

SODIUM BENZOATE

U. S. P.

Food processors and bottlers who have used Monsanto Sodium Benzoate, U.S.P. in both powder and flake form, prefer flakes. They have found that flakes flow more freely and evenly than powder, do not lump or ball, create less dust and are, therefore, less objectionable to operators. This also means easier handling and blending for uniform results.

From the standpoint of product purity, both flake and powder forms are manufactured to equally high standards . . . Samples of either or both will be sent on request. Try them and see why flakes are preferred. Contact the nearest Monsanto District office, or write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri . . . District Offices: New York, Chicago, Cleveland, Boston, Detroit, Charlotte, Cincinnati, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

MONSANTO CHEMICALS

SERVING INDUSTRY...WHICH SERVES MANKIND

GENUINE Popsicle PRODUCTS ON A STICK

Joe Lowe Corp. required a special

STAINLESS STEEL Measuring Valve...

*for the production of "Popsicle"**

Designed, Cast and Machined to rigid specifications

by COOPER ALLOY

Stainless Steel POPSICLE* filling machine, automatically measures and delivers exactly enough fluid POPSICLE* liquid to make 24 confections simultaneously. The design features extreme sanitation; great accuracy; easy complete assembly and disassembly for thorough cleaning.

*T.M. Reg. U.S. Pat. Off.

The Measuring Valve illustrated is typical of the many Stainless Steel items produced by Cooper Alloy for the process industries. It combines sound casting practice; accurate machining and lapping; and sanitary polishing.

25 YEARS

THE COOPER ALLOY FOUNDRY CO.

HILLSIDE, NEW JERSEY

Specialists in Corrosion Resisting Stainless Steel . . . for a Quarter of a Century

MEN • JOBS • COMPANIES

INDUSTRY

American Institute of Baking, Chicago, according to its president, L. E. Caster, is undertaking a comprehensive program of study on cakes and sweet goods. Additional equipment has been added to the facilities of the laboratory. Charles Faulstich has recently joined the staff. He will work under the direction of Dr. William B. Bradley, head of the laboratory.

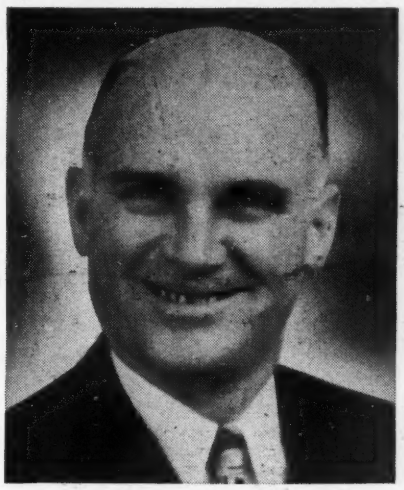
The Committee of Food Sanitarians, recently organized for the purpose of accumulating and disseminating information relating to problems of insects and rodent control specifically encountered by the food processor and manufacturer, has elected the following officers for 1947: chairman, E. M. Searles; vice chairman, E. L. Holmes; secretary, J. P. Barrett; treasurer, G. S. Doolin.

The Facilities Review Committee, Office of Temporary Control, has approved the following construction projects in the food field: Nestle's Milk Products, Freehold, N. J., for the manufacture of its coffee product, $522,000; Farmers Supply Co., Tillamook, Ore., grain storage, $6,000; Gold Medal Dairies, Missoula, Mont., addition to dairy, $2,500; Gold Medal Dairies, Missoula, Mont., milk and cheese processing, $2,500; Wisconsin Creamery Co-op, Sauk City, Wis., milk processing plant, $600,000; Garden City Dairies, Missoula, Mont., dairy building, $85,000.

Thomas J. Lipton, Inc., has announced the appointment of Louis W. Webster and Wallace Kennedy as vice-presidents. Mr. Webster has been general comptroller of the company since 1940 and Mr. Kennedy joined the Lipton organization in 1943 as general manager of the Continental Foods subsidiary.

Maxson Food Systems, Inc., New York, has announced the appointment of Leonard Spitz as vice-president in charge of engineering, production and purchasing. During the war, as commissary manager for Government Services, Inc., Washington, Mr. Spitz was in charge of providing 250,000 meals per day in the government buildings. For the past several months Mr. Spitz has been in charge of production in the Maxson plant at Queens Village, N. Y.

Melville Confections, Inc., Chicago, has purchased and taken over the operation of the Walter O. Birk Candy Co., Chicago. W. Melville Cribbs, former general manager of the Chicago plant of National Candy Co., is president of Melville Confections.



JOHN T. KNOWLES

Having been elected a vice-president of Libby, McNeill & Libby, John T. Knowles will have supervision of all laboratories of the company and will direct the company's research and quality control program. He joined Libby 36 years ago.

JAMES F. HALE

Recently placed in charge of research and development work of the grocery products division of the Borden Company, James F. Hale has taken up his new duties as head of the Borden laboratories in Syracuse, New York.

Polak & Schwarz, Inc., flavor manufacturer, has purchased land in Teterboro, N. J., for the erection of its new flavor extract plant. Ground will be broken in March or April and proposed plans call for a $250,000 edifice occupying some 40,000 to 50,000 sq. ft.

Swift and Co. will erect a new packing house at Clinton, Iowa, serving the company's 48 packing plants at strategic points throughout the country. The new unit will be a federally inspected meat packing plant which will handle cattle, calves, hogs and lambs.

PERSONNEL

Dwight B. Austin, former first vice-president, Middle Western division, Great Atlantic & Pacific Tea Co., Chicago, has been made president of the division, succeeding the late Arthur G. Hoadley.

Robert E. Bauer, packaging engineer for Deerfield Packing Corp., Seabrook Farms, Bridgeton, N. J., has been appointed chairman of the National Association of Frozen Food Packers packaging committee. Appointment was made by E. E. Huddleson, NAFFP president.

H. A. Clemmer, manager of Sunshine Biscuits, Inc., New York bakery, since 1933, has been promoted to the position of special assistant to Hanford Main, president of the company. James Larrimore, assistant manager of the New York bakery, succeeds Mr. Clemmer.

T. Wilson Eddy has resigned from Western Regional Research Laboratories, USDA, to head the research division of Kelly, Douglas & Co., Ltd., Vancouver, B. C., food specialty manufacturer.

William F. Etz has been appointed head of the provision department, Wilson & Co., Chicago, succeeding W. S. Nicholson, retired vice-president in charge of provisions. Wayne C. Jackson has been appointed supervisor of hog buying operations, succeeding C. H. Romeiser, also retired.

Dr. G. B. Fehmerling, Jr., has been appointed chemist of Southland Frozen Foods, Inc., Plant City, Fla.

Henry T. Heald, president, Illinois Institute of Technology, Chicago, has been elected a director of Swift & Co., Chicago.

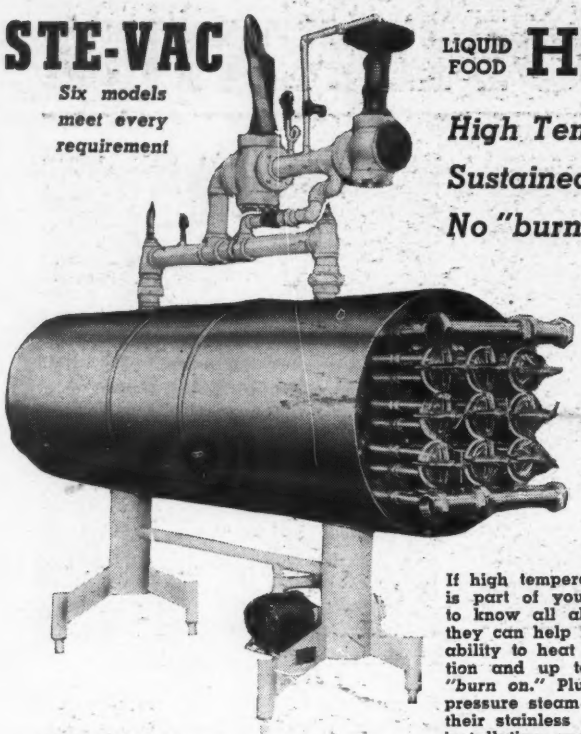
Edward S. Holloway is now superintendent of the Wm. P. McDonald Corp. plant at Auburndale, Fla.

M. B. Jordan is now food technologist in charge of production for Indian River Citrus Products, Inc., Cocoa, Fla. He formerly was research associate for Florida Citrus Commission, assigned to the Florida Experiment Station at Gainesville.

Adrian D. Joyce, president of The Glidden Co., Cleveland, since it was founded in 1917, has been elected chair-

STE-VAC LIQUID FOOD HEATERS

Six models meet every requirement



High Temperatures
Sustained Heating
No "burn on"

- 5,000 to 40,000 lbs. per hour capacity
- Quickly adapted to practically any liquid food heating operation.

Shown above is the SV-40, largest of the Ste-Vac Heaters. Its 48 tubes, each 10' in length, can handle up to 40,000 lbs. of liquid food products per hour. Floor space required: 40" x 11'6". Shipping weight: 3800 lbs.

Designers and manufacturers of foods handling equipment since 1899.

If high temperature processing of liquid foods is part of your plant operation, you'll want to know all about Ste-Vac Heaters and how they can help increase production. About their ability to heat up to 190° in one stage operation and up to 240° in two stages—*without* "burn on." Plus their utilization of dry, low-pressure steam under self-acting controls. Plus their stainless steel construction, their ease of installation and the many other Ste-Vac features which make them readily adaptable to your plant and product, and assure you of maximum heating efficiency.

There's a Ste-Vac Heater for your particular needs. Write for detailed information and specifications.

CHESTER DAIRY SUPPLY CO.

5TH & TILGHMAN STS. CHESTER, PENNA.

SYNTRON

"Vibra-Flow"

VIBRATORY FEEDERS

with Rheostat Control of Material Flow

PROVIDE THE EASY, ECONOMICAL WAY TO HANDLE FOOD PRODUCTS

Feeding many types of bulk materials—coffee, starch, sugar, flour, spices—screening fines out of diced vegetables and, at the same time controlling the filling of the trays.

Available with flat pan, tubular, spreading, dewatering and other type troughs with capacities up to 500 tons per hour.

Write for Folder No. 9-46

SYNTRON CO., 460 Lexington, Homer City, Pa.

man of the board of directors. He is succeeded as president by his son, Dwight P. Joyce.

Irving C. Reynolds, chief, Perishable Section, Subsistence Branch, Office of the Quartermaster General, has been presented the exceptional civilian service award by T. B. Larkin, Quartermaster General of the Army. Mr. Reynolds, president and founder of the Franklin Creamery Co., Toledo, and Cleveland, is credited with exceptional service with the Office of the Quartermaster General in establishing procedures for the procurement of perishable foods, and in negotiations necessary to complete transactions to supply emergency needs of the armed forces during the period following cessation of hostilities.

T. N. St. Hill, president of Tea Garden Products Co., San Francisco, was elected president of the National Preservers' Assoc. at its recent convention in Atlantic City.

Dr. T. L. Swenson, who was expected to transfer from the Western Regional Research Laboratory to the Washington office of the Bureau of Agricultural and Industrial Chemistry, has aecepted a position with Stanford Research Institute, Palo Alto, where he will be in charge of food investigation for that research agency.

Lewis B. Wall has been named president of the bulk pre-mix division of Pillsbury Mills, Inc., Minneapolis. He formerly was vice-president of the division, which was created to produce, sell and merchandise bulk prepared mixes for bakery and institutional use.

Richard R. Walton, formerly of the Container Corp. of America, and more recently of the Military Planning Division, Office of the Quartermaster General, is now with American Research & Development Corp., Boston.

R. R. Williams, professor of chemistry at the University of Texas, has been awarded the Perkin Medal by four scientific societies in recognition of his synthesis of vitamin B_1.

Dr. C. Lewis Wrenshall, head of the organic and agricultural chemistry division of Southern Research Institute, has been selected to direct the technical activities of Foremost Dairies, Inc., Jacksonville, Fla., a sponsoring company of the Institute.

Dr. Leo Rane, formerly of American Cyanamid Co., has announced the opening of a consulting service in Boston with offices at 41 Tremont St., where he will specialize in high vacuum dehydration of foods. During the war, Dr. Rane was director of the frozen and dried blood plasma laboratory operated for the Armed Forces by Cyanamid's Lederle Laboratories Division.

Sheave to Transmit 1400 Horsepower...

...or a Belt for a 1/4 hp Compressor!

CALL ON THE TEXROPE LINE for the *best* in V-belt engineering and V-belt equipment. That has been true for 22 years — ever since Allis-Chalmers originated the Multiple V-belt drive for industry.

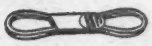
Back of every *Texrope* installation — from fractional horse power V-belts that manufacturers put on washers, air-compressors or water systems—to the biggest V-belt drives ever designed and successfully applied—stands the finest V-belt engineering talent in the world.

There's no substitute for this vast experience and tremendous fund of knowledge. It is reflected in every *Texrope* product.

What do *you* need . . . a few V-belts and sheaves — or a daring new application of the multiple V-belt principle? Call on the *Texrope* line! Equipment and engineering help are as close as your nearest A-C sales office or dealer. ALLIS-CHALMERS, MILWAUKEE.

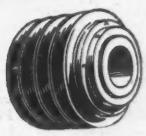
A 2187

TEXROPE .. Greatest Name in V-Belt Drives



"Super 7" V-BELTS
Five Types — Sizes to suit every power transmission job.

Texsteel, Texdrive, "Magic-Grip"
— sheaves in a full range of sizes, grooves.



"Vari-Pitch" SHEAVES
Exact variations in speed, stationery or motion control.

SPEED CHANGERS
Speed variations up to 375% at the turn of a crank.

ENGINEERING
Finest V-Belt engineering talent in the world—at your call.

TEXROPE "Super 7" V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich. They are sold only by A-C.

ALLIS-CHALMERS

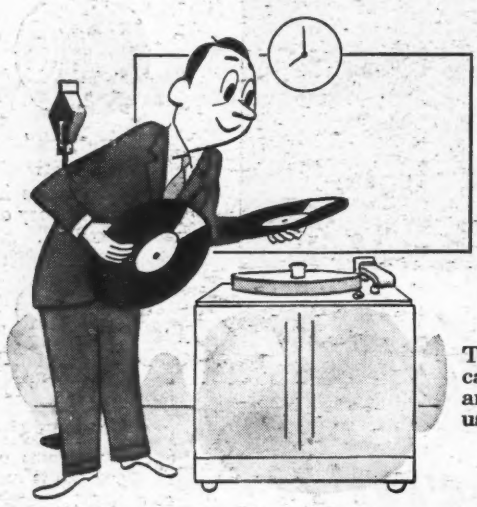
One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947 A CENTURY OF SERVICE to Industry THAT MADE America Great

What's so "alike" about these things?

Nylons have to get to sales on time. *Speed* counts. And the speed of Air Express delivers 'em pronto.

Great Britain's reconstruction needed blue prints quickly. International Air Express saved days in their delivery.



Transcribed radio programs can't be late! *Speed* counts—and that's why radio people use Air Express regularly.

You need the speed of Air Express, too!

You're in a business where speed counts, and Air Express can serve you well. Today, more and bigger planes are carrying your Air Express shipments at speeds up to five miles a minute. Rates are low. For example: to Air Express a 17-lb. shipment 1149 miles costs $5.74. Heavier weights similarly inexpensive. Investigate!

- Special pick-up and delivery at no extra cost.
- Direct by air to and from principal U. S. towns and cities.
- Air-rail between 23,000 off-airline communities.
- Direct air service to and from scores of foreign countries.

AIR EXPRESS

AIR EXPRESS — GETS THERE FIRST

Write today for Rate Schedules containing helpful shipping aids. Address Air Express Division, Railway Express Agency, 230 Park Avenue, New York 17. Or ask at any Airline or Railway Express office. Air Express Division, Railway Express Agency, representing the Airlines of the United States.

ASSOCIATED INDUSTRIES

The Can Manufacturers Institute has made known the election of Robert F. Solinsky as president of the organization for 1947. Mr. Solinsky is president of Cans, Inc., Chicago. He replaces George A. Nelson as institute president.

Corning Glass Works has made the following executive changes: Eugene W. Ritter, vice-president and manager of Corning consumer products division, will become president of Corning Glass Works of South America, succeeding William H. Curtiss, who will continue as vice-president and secretary of the company with general supervision of its affiliates in South America. Arthur W. Weber, manufacturing manager of the consumer products division and acting manager of the division's pressure plant at Corning, will now devote full time to the expanding manufacturing operations of the entire division.

Fairbanks, Morse & Co., Chicago, has announced the appointment of John S. King as manager of the Chicago branch.

J. L. Ferguson Company, Joliet, Ill., manufacturer of packaging machinery, has appointed Carl A. Claus vice-president in charge of Eastern sales.

Liquid Carbonic Corp. has announced the retirement of W. K. McIntosh as chairman. He will remain in the corporation in an advisory capacity and as chairman of the board of directors.

The Mathieson Alkali Works has named George B. Armstrong as manager of the carbon dioxide division, succeeding Charles T. Longaker, who resigned.

Monsanto Chemical Company, St. Louis, has appointed Dan J. Forrestal, Jr., assistant to the director of industrial and public relations.

Joseph T. Ryerson & Son, Inc., Chicago, steel distributor, has appointed Park Sanderson manager of the Boston plant. He succeeds Herbert T. Wills, who is retiring.

DEATHS

Dr. Harry E. Barnard, 72, leader in Indiana's pioneering sanitation legislation, December 31, at Indianapolis.

Phillip L. Borden, 71, secretary-treasurer of the Coca Cola Bottling Co., Jackson, Miss., January 2, in Jackson.

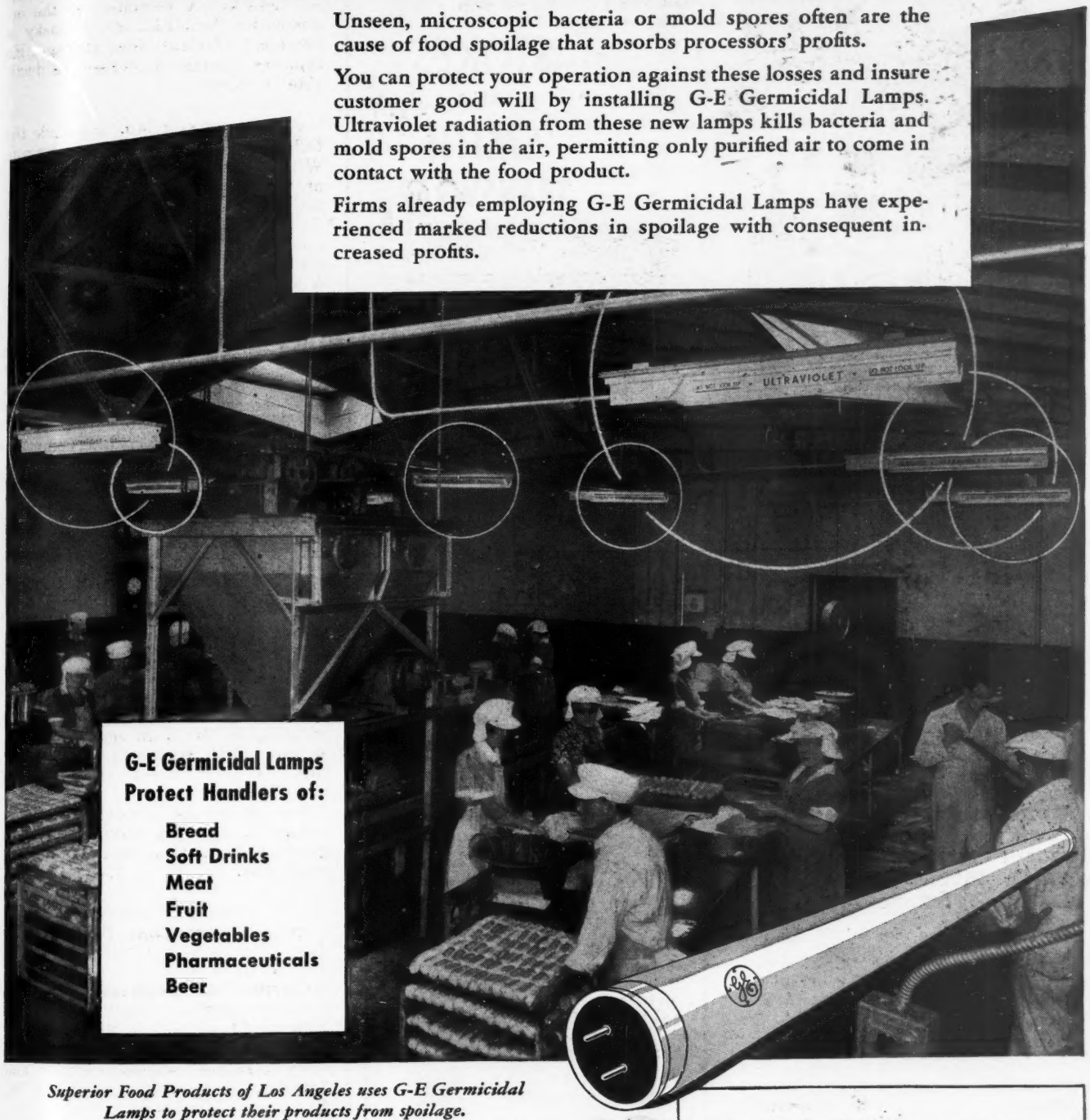
What you can't see can hurt you!

G-E GERMICIDAL LAMPS PROTECT AGAINST THE INVISIBLE CAUSE OF CONTAMINATION LOSS

Unseen, microscopic bacteria or mold spores often are the cause of food spoilage that absorbs processors' profits.

You can protect your operation against these losses and insure customer good will by installing G-E Germicidal Lamps. Ultraviolet radiation from these new lamps kills bacteria and mold spores in the air, permitting only purified air to come in contact with the food product.

Firms already employing G-E Germicidal Lamps have experienced marked reductions in spoilage with consequent increased profits.



G-E Germicidal Lamps Protect Handlers of:

- Bread
- Soft Drinks
- Meat
- Fruit
- Vegetables
- Pharmaceuticals
- Beer

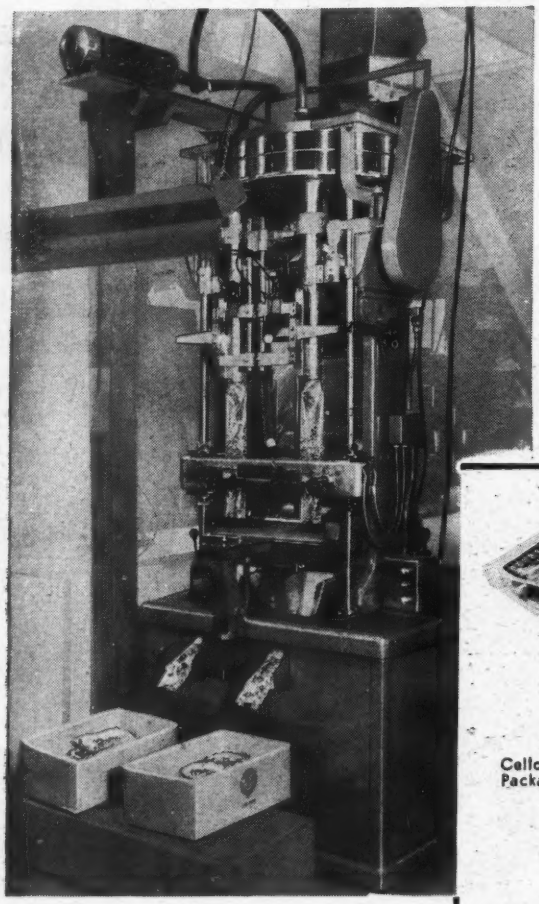
Superior Food Products of Los Angeles uses G-E Germicidal Lamps to protect their products from spoilage.

G-E LAMPS

GENERAL ELECTRIC

G-E Germicidal Lamps look like fluorescent lamps, but have a special clear glass. General Electric makes only the lamps, not the fixtures in which they must be used. For further information write: General Electric, Nela Park, Dept. FI-3, Cleveland 12, Ohio.

Proven Protection for FROZEN FOODS with *Automatic Packaging*



STOKES AND SMITH TRANSWRAP MACHINE specially constructed for frozen foods

Cellophane Transwrap Package with Printed Tab.

Cellophane Transwrap Package in Window Carton.

Cellophane Transwrap Package in Printed Carton.

INSTALLATION OF TRANSWRAP MACHINE AT BUCKS COUNTY FROZEN PRODUCTS, INC., DOYLESTOWN, PA. PACKAGING PRE-FROZEN FOODS IN MOISTURE VAPOR - PROOF CELLOPHANE PACKAGES

The pre-frozen foods are fed through a hopper to the transwrap machine. The machine feeds the cellophane from the roll, automatically forms the bags, fills a measured quantity of the product into the bag and heat seals, delivering the complete packages ready for packing in the container at speeds of 40 or more per minute.

Various styles and combinations of packages can be used,—making this the ideal machine for "Frozen Food" Packagings.

STOKES & SMITH Co.
Packaging Machinery — Paper Box Machinery
4911 SUMMERDALE AVE., PHILADELPHIA 24, PENNA.
FILLING · PACKAGING · WRAPPING MACHINES

See the Transwrap in action at the Packaging Exposition, Philadelphia Convention Hall, April 8 to 11. Booth 601-602.

"Better machines for better packages"

Dr. C. A. Browne, 76, retired Department of Agriculture research chemist, nationally known for his work in sugar analysis, February 3, in Washington, D. C.

Leon A. Fuller, 77, president of the Fuller Grain Co., Kansas City, Mo., January 29, at West Palm Beach, Fla.

Frank Hermes, vice-president, Milprint, Inc., Milwaukee, January 6.

A. Hewitt, 68, president, Leslie Salt Co., San Francisco, Jan. 19.

Bert W. Huntoon, 76, engineer, Pacific American Fisheries, Bellingham, Wash., January 1.

Joseph Kindleberger, 71, founder and president, Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich., January 1.

James T. McCarrier, 63, formerly assistant treasurer, Cudahy Bros., Los Angeles, January 16.

Adolph Meyer, 75, honorary president, Pet Milk Co., and a company founder, San Jose, Calif., January 5.

Louis P. Minoggie, 57, president, Dairy Co-Operative Assoc., Portland, Ore., January 9.

L. E. Myers, 51, chemist, Lauhoff Grain Co., Danville, Ill., January 16.

Jacob F. Scholl, 85, stockholder and operator, Baker Mill & Grain Co., Baker, Ore., December 7.

David E. Stephens, 67, leading grain authority in the Northwest, and for 38 years with Washington State Agricultural Dept., December 10 at Pullman, Wash.

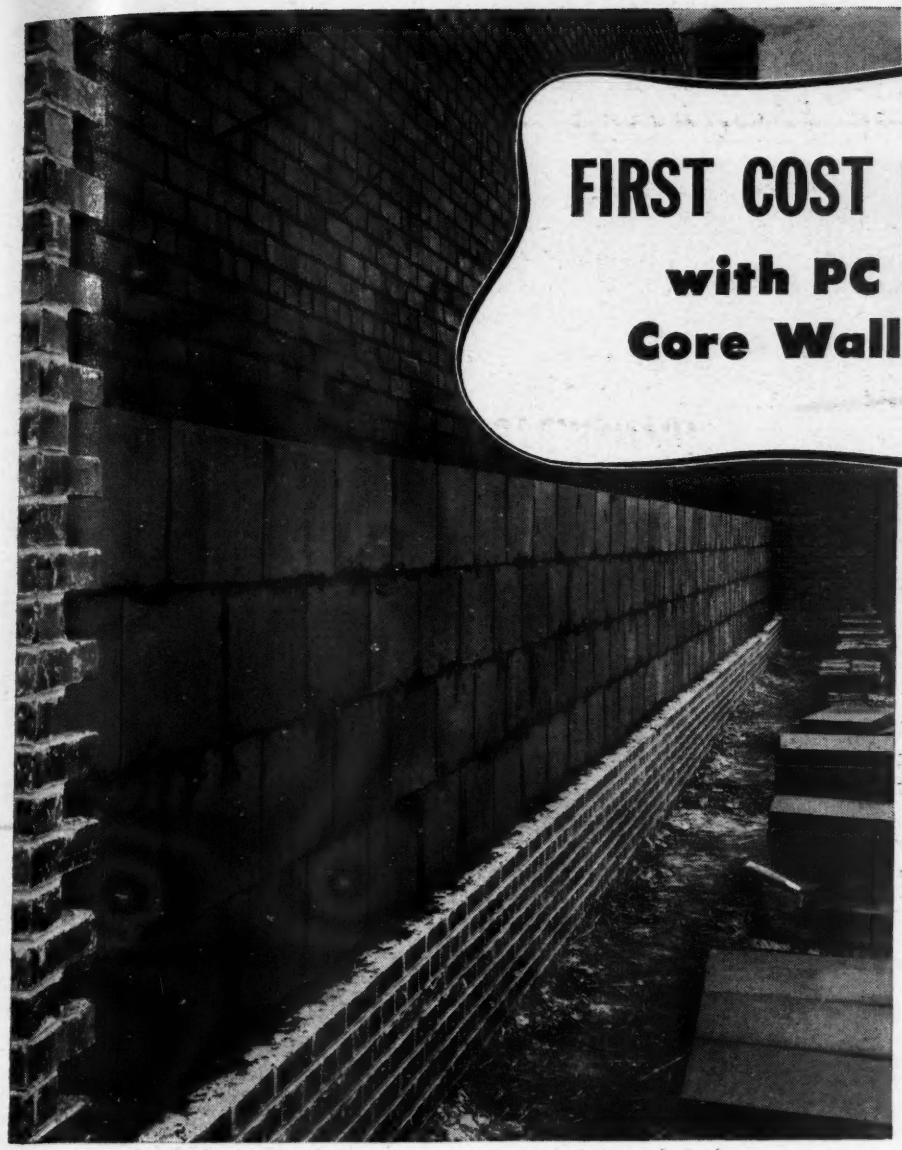
Roy H. Tallman, executive, Amalgamated Sugar Co., Boise, Idaho, December 27.

G. D. Ullrich, 66, director, Imperial Sugar Co., Sugar Land, Tex., January 22.

Clarence L. Vanderburg, 51, vice-president, Imperial Candy Co., Seattle, January 13.

P. C. Wilson, retired executive and founder, Triangle Wholesale Meat Co., San Diego, January 11.

W. G. Wormley, manager of the Mountain View Supply Co., September 5, 1946. Starting with H. J. Heinz Co. nearly 50 years ago, he had been with Libby, McNeill & Libby, California Packing Corp., Widlar Division of Standard Brands and other companies. He ended his long career as a pickle and condiment manufacturer in Mountain View, Calif. A number of articles in Food Industres on the subject of pickle salting were the products of his ripe experience.



FIRST COST IS LAST COST

with PC Foamglas Core Wall Insulation

BECAUSE—The big light blocks consist of millions of minute air cells, enclosed in pure glass.

Because, being glass, PC Foamglas is waterproof, fireproof, verminproof, and impervious to most acids. It withstands high humidities, helps to maintain predetermined temperature levels, to minimize condensation.

Because repairs, maintenance, replacement—due to failure of the material—are virtually unknown. When you insulate with PC Foamglas, you insulate FOR GOOD.

Check other insulations carefully, when you are considering insulation for roofs, walls and floors, and compare them with PC Foamglas. That is how you can buy insulation on a "last cost" basis, with PC Foamglas. For full information, send for free copies of our booklets. Pittsburgh Corning Corporation, 632 Duquesne Way, Pittsburgh 22, Pa.

· Also Makers of PC Glass Blocks ·

FOR ADDITIONAL INFORMATION SEE OUR INSERTS IN SWEET'S CATALOGS.

Pittsburgh Corning Corporation
Room 419, 632 Duquesne Way
Pittsburgh 22, Pa.

Please send me without obligation, your free booklets on the use of PC Foamglas insulation for:

Roofs_____ Walls_____ Floors_____

Name_____

Address_____

City_____ State_____

PC FOAMGLAS *Waterproof Fireproof* **INSULATION**

T. M. REG. U. S. PAT. OFF.

FOOD EQUIPMENT NEWS

Automatic machine applies thermoplastic coated labels to 300 bottles per minute

High Speed Labeler 1

A NEW, fully automatic, high-speed machine, designed to apply labels to bottles at the rate of 300 per min., utilizing thermoplastic labels, has been introduced by New Jersey Machine Corp., Dept. I, Hoboken, N. J. The Label-Dri, as it is called, eliminates the use of liquid or paste adhesives, or water which has always been used to thin down the adhesives, or to moisten gum labels. The machine has no cams and the bottles are screw-fed to avoid bottle clashing. The screw engages the bottles on the conveyor line, and spaces them to synchronize with the rotating turret which applies the labels. The turret is heated so that the thermoplastic coating on the labels becomes tacky, and they are transferred by air jets that literally blow the labels against the bottle in registered position. A time clock and thermostatic control automatically prepare the machine for operation before the plant opens. In the entire machine there is only one change part, that being the screw which engages and spaces the bottles as they enter.

Acoustic thickness detector

Thickness Detector 2

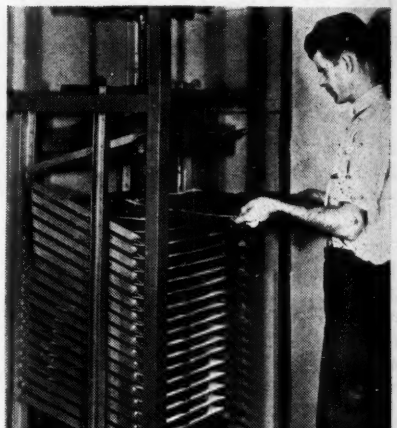
THICKNESSES of a variety of materials, such as steel, aluminum, brass, copper, and glass, can be determined from one side only, by means of a new acoustic thickness gage, the Audigage, Model FMSS-4, made by Branson Instruments, Inc., Dept. I, Joe's Hill Road, Danbury, Conn. This lightweight, portable self-contained instrument includes its own power supply and can be used in measuring he thickness of pipes, storage tanks, pressure vessels and other equipment in the range from $\frac{1}{4}$ to 12 in. It is claimed that factors such as the kind of material, condition of the reflecting surface, backing-up liquids, and process scale vary the audible indications and provide useful information, but that they do not influence the accuracy of the thickness measurement.

The device utilizes a crystal-type gage head; powered by a frequency-modulated electronic oscillator. When the vibrating crystal is applied to a wall surface, mechanical resonance can be produced directly below the crystal. The fundamental frequency at which the wall section will resonate is directly proportional to the velocity of sound in the material and inversely proportional to the thickness. The frequency difference between any two adjacent audible signals can be read on the tuning dial and converted directly into wall thickness on a concentric thickness scale.

The instrument is simple to use. The small crystal can be applied to flat surfaces as well as to curved surfaces with a radius of 1 in. or more. Porous material, such as cast iron and concrete, can not be measured in this fashion.

Stack Filter Press 3

A STACK filter press of cast iron construction, that combines plate and frame in one casting to permit easy removal of cakes, has been developed



Vertical stack filter press of cast iron

by the Youngstown Miller Co., subsidiary of Walter Kidde & Co., Inc., Dept. I, 675 Main St., Belleville, N. J. Starting with the top frame, each

WRITE FOR MORE INFORMATION

Food Industries Reader Service now makes it easy for you to follow up the news on new equipment and new materials. Tear-out coupon cards are supplied for your convenience on the special colored page which follows the equipment news section in this month's issue. Enter your requests, fill out and mail cards, and let Reader Service do the rest.

section is individually latched in an elevated position to permit the filter paper and cake to be pulled forward out of the press. The cake is quickly removed and the filter paper replaced. Frames are then re-lowered into position and tightened by a hand screw, forming a tight press. The filtering area is 31 sq. ft. with 2 cu. ft. of cake space. The press is suitable for the filtration of molasses, honey, fruit sirups, fish, linseed, castor and essential oils and cutting oils and coolants.

Automatic Counter 4

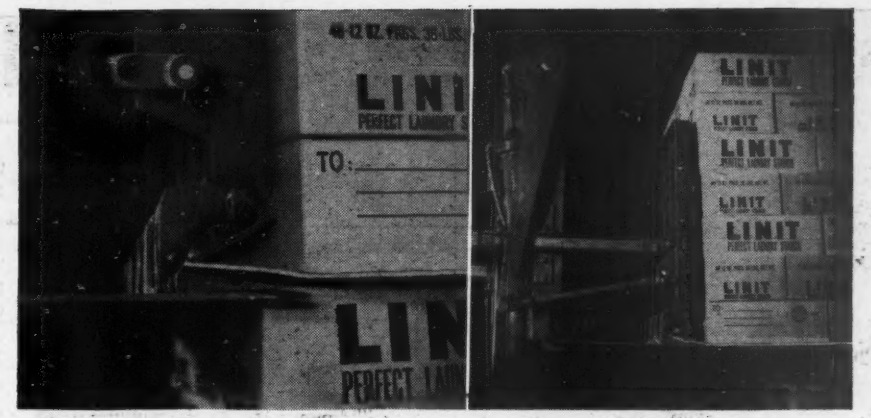
TESTED for two years in California and Arizona produce packing houses, the Conveyco automatic packer-counter for keeping track of piecework, has been found a good tool, and is

Packer-counter records piece work.

now in production by the Conveyor Co., Inc., Dept. I, 3260 E. Slauson Ave., Los Angeles 11, Calif. At each packer's place, there is a button, which he pushes on finishing a crate. A red light assures him that his work has been registered on his counter. Each packer has a counter on the central board, and there is a totalizer which records the total work in the plant. The counter is made in 10 and 20 place models.

Loads Without Pallets 5

A NEW method of simplified material handling, with unit loads mounted on disposable carrier sheets instead of on conventional wood or metal pallets, is announced by Clark Tructractor, Dept. I, a division of Clark Equipment Co., Battle Creek, Mich. "Pul-Pac" as it is called is a combination of a push-pull attachment for Clark forklift trucks, with a flat steel plate serving in place of conventional forks, combined with an inexpensive load base of paper or other material, to receive, lift and carry unit loads. A hydraulically actuated gripper device moves forward, clamps an extending margin of the carrier sheet and pulls sheet and load onto the plate. At destination the load is lifted and registered directly over the area onto which it is to be deposited, and the pusher device,



"Pul-Pac" attachment handles unit loads on paper board sheets. (Left): Gripper jaws close on extended carrier sheet. (Right): Unit load is pulled onto flat steel plate.

working against the load, deposits the carrier sheet and its cargo in the exact desired position as the backing truck withdraws the carrier plate.

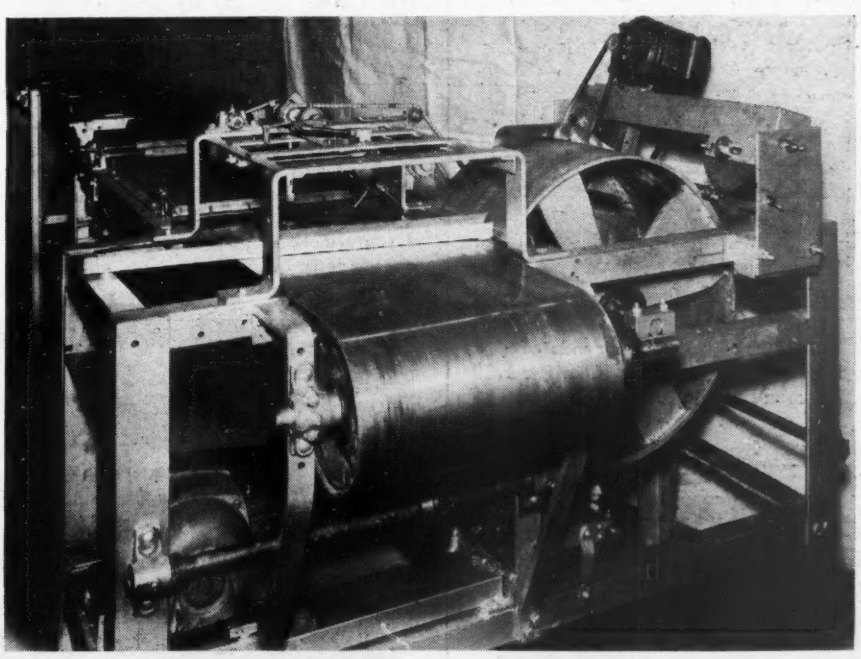
Benefits expected from the use of "Pul-Pac" method are: Greatly reduced pallet costs; no pallet maintenance; saving of practically all storage space required for empty pallets; no cost of returning pallets; reduced freight cost; handling package or bag loads ordinarily packed on pallets; tiering of loads more compactly and more securely; and carrier sheet serves as car liner during shipment.

Fish Fillet Skinner 6

A MACHINE that skins fish fillets at the rate of 60 a minute is produced by General Marine Works, Dept. I, Seattle, Wash. After the filleters remove the bone, the split fish are placed on a conveyor belt with the skin side down. A bar lifts and lowers to allow only one fish to enter the machine at a time. Past the bar, a fork sinks into the fish just above the tail and directs it onto a rotating drum. Here the tail is clamped firmly and the entire piece drawn past an oscillating band knife. The fillet drops down a chute into a waiting box while the skin drops off the drum at the bottom of its revolution. The drum is continuously cleaned by a brush. Skinning two fish with each revolution, the machine is claimed to do the work of 15 men, handling fillets up to 12 x 36 in.

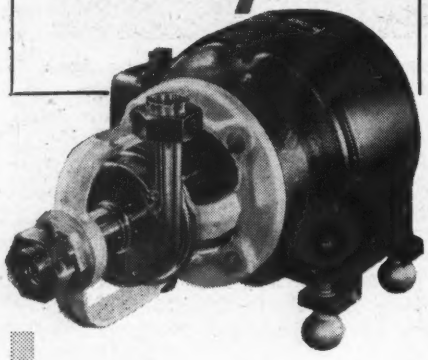
Thermoplastics Welder 7

TYPE K3S is the designation of a new 2½-kw. Thermatron dielectric heat sealer for sealing, bonding or welding thermoplastic sheets. It is made by the Thermatron Division of the Radio Receptor Co., Dept. I, 251 West 19th St., New York 11, N. Y. The device eliminates thread-stitched seams, produces airtight, water-tight seams stronger than the sheets themselves, and may be used on a wide variety of thermoplastics such as Vinylite, Koroseal, Saran and Velon. The unit may be provided with several standard types of sealing press mounted on the unit and operated by foot controls. A wide range of seams of various lengths can be produced. Sheet thickness from



Machine skins fish fillets at rate of 60 per minute

Flexflo
STAINLESS STEEL
Pumps



For Milk, Cream, Ice Cream Mix, Fruit Juices, and other liquid food products.

•

Foamless

•

Sanitary

•

Easy to Clean

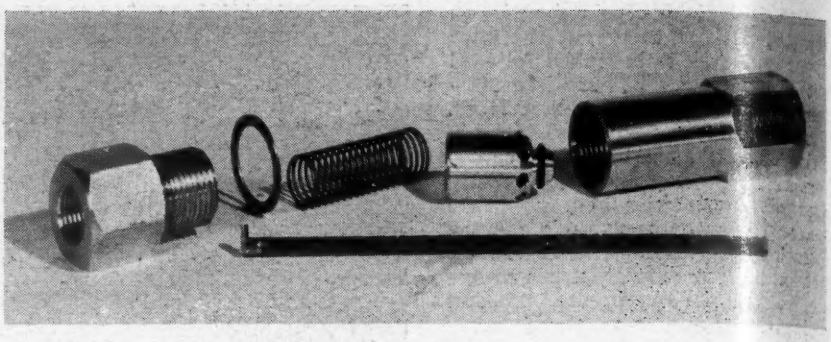
2,000 to 100,000 pounds of milk per hour. See your Cherry-Burrell man or write today.

CHERRY-BURRELL CORPORATION

427 West Randolph Street,
Chicago 6, Illinois

Milk and Food Plant Equipment and Supplies

FACTORIES, WAREHOUSES, BRANCHES, OFFICES OR DISTRIBUTORS AT YOUR SERVICE IN 52 CITIES



Check valve eliminates leakage due to grit

0.002 to 0.040 in. can be handled. Features of the device include special air-cooled tubes, oversize casters, safety interlocks, and simplified controls.

Check Valve 8

A NEW check valve developed by Mansfield & Green, Dept. I, Cleveland, Ohio, contains a simple double seal which completely eliminates leakage and loss of pressure even with grit in the system. It utilizes a metal to metal seat, plus a resilient rubber or synthetic rubber ring seal on the check valve poppet. The line pressure forces the resilient ring to the metal seat, which force increases with increase of pressure, resulting in greater sealing force at higher pressures. Available sizes range from ⅛ to 1 in. SPT, for pressures to 10,000 psi., and any media not destructive to rubber.

Packaging Machine 9

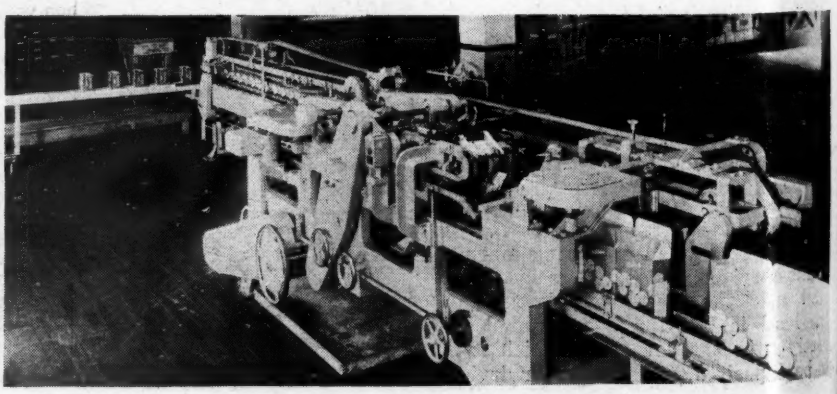
AN automatic packaging machine to help manufacturers of crackers, macaroni, cereal foods, potato chips, prepared mixes and dried fruits protect the oven freshness of their product until it reaches the ultimate consumer has been perfected by the Battle Creek Bread Wrapping Machine Co., Dept. I, Battle Creek, Mich. Known as Model 400, the machine creates a triple rolled fold on the top of the inner liner within a carton (heating or gluing the fold if desired); tucks in the triangulations neatly; then glues, tucks and dries the top flaps of the carton and completes the package. The operations are handled by continuous flow with the packages conveyed through the machine under constant motion. Operating speeds up to 100 per min. may be obtained. No operators are needed and the machine can be fitted into any production line to handle lined cartons. Almost any type of paper may be handled and sealed either by heat or glue. The full protective value of the sheet selected is maintained with the triple fold.

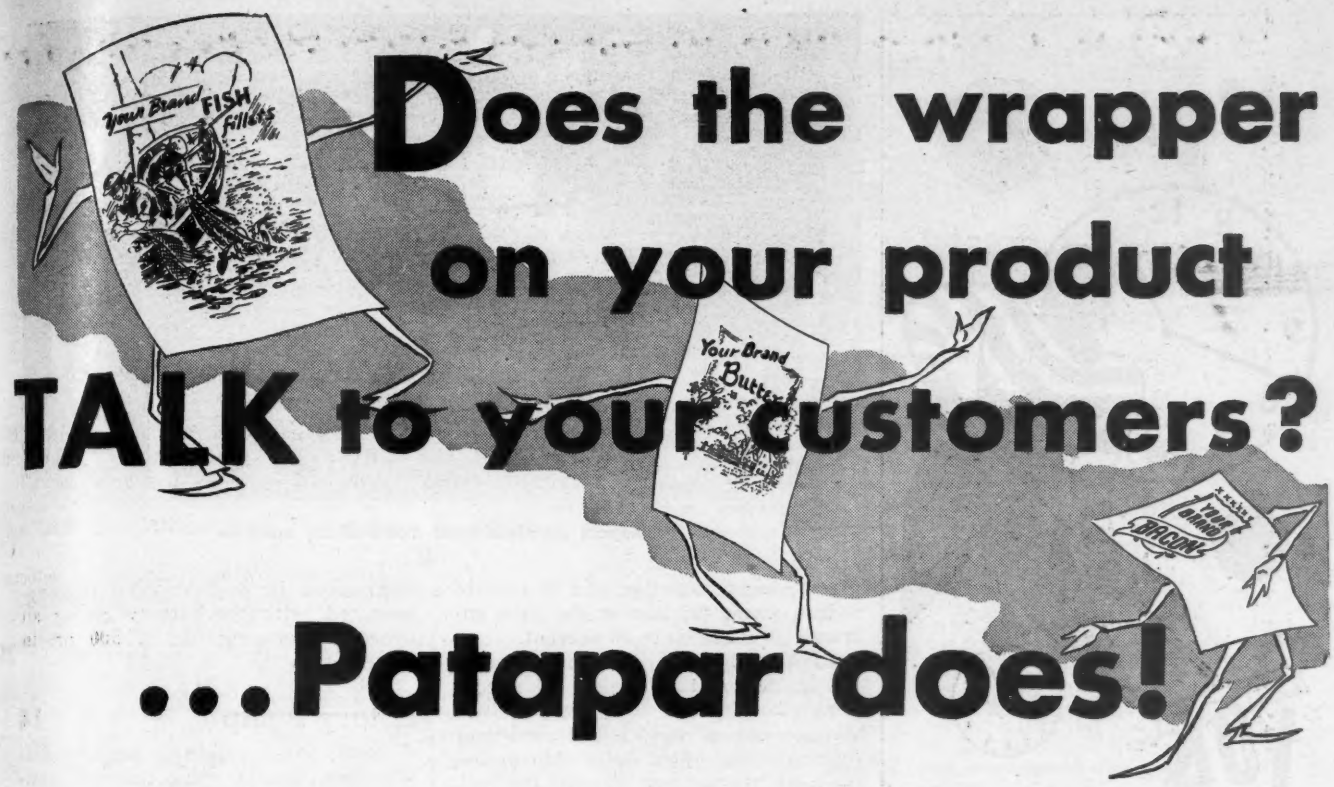
Unitizing Case Gluer 10

TO assist shippers of food, beverages and other products in fragile or breakable containers, The Crowe Engineering Co., Dept. I, Cincinnati 16, Ohio, has developed the Crowe Unitizer Case Gluer. By its use containers are glued together so that any movement must be of the entire load, thereby limiting breakage to a minimum. The unit contains all items required to take care of the job. It can be quickly adjusted for various widths of cases and raised or lowered to fit any conveyor system.

Condenser Helps 11

TWO new devices to improve use and maintenance of condensers have been announced by Condenser Service & Engineering Co., Dept. I, Hoboken, N. J. The first of these is the new Fiberclad Flowrite, which is used to protect condenser tube inlet ends against erosion and to prevent leakage even though tubes may be eroded badly at the time of installation of the new devices. For many years this company has offered metal belled-end tube inserts for the purpose indicated. The new type consists of such a metal tube with a thin fiber sleeve shrunk on the outside. Installation is simple, requiring no cement and no special care. In contact with water, the fiber swells to produce an extremely tight seal. The device





Does the wrapper on your product TALK to your customers?

...Patapar does!

Patapar* Vegetable Parchment wrappers don't actually make a noise. But when they're printed with attractive designs in bright colors they look so appealing they seem to say, "Here, take me home with you."

We print Patapar here in our own plants which are completely equipped for letterpress and lithographic printing. We'll print your Patapar wrappers in one color or several colors. We'll create designs for you, suggest colors, submit sketches, make the engravings — handle every detail.

High wet-strength • Grease-resisting

With Patapar wrappers your product gets protection as well as sales appeal. Patapar has the quality of high wet-strength. It can be soaked in water for weeks — even boiled and remain strong. Grease-proofness is another of its characteristics. When Patapar comes in contact with fats, grease or oils it resists penetration.

Patapar is odorless, tasteless, pure of texture.

KEYMARK *FREE* When you order printed Patapar we'll gladly include the Keymark on your wrappers at no extra cost. This Keymark is nationally advertised. Women know it as a symbol of protection. And when they see it on your wrappers it reminds them that your product inside is well protected.

*Reg. U. S. Pat. Off.

Paterson Parchment Paper Company • Bristol, Pennsylvania

Headquarters for Vegetable Parchment Since 1885

WEST COAST PLANT: 340 BRYANT STREET, SAN FRANCISCO 7, CALIFORNIA

BRANCH OFFICES: 120 BROADWAY, NEW YORK 5, N. Y. • 111 WEST WASHINGTON ST., CHICAGO 2, ILL.

104

man hours saved with each clean-up of "pork-kill" floors

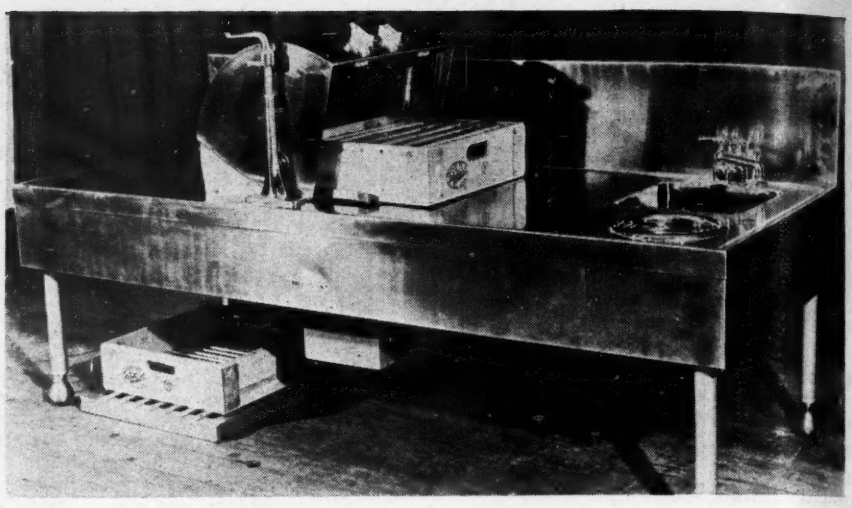
Does this sound almost too good? It happened when a large Western packer switched to Metso Granular for concrete floor cleaning. Floor cleaning previously took sixteen men eight hours, and when Metso was used four men did the work in six hours.

Metso pulls the mixed blood and fat out of the concrete pores, and it's easier to clean up the next time. With continued use of Metso, floors are freed of the stubborn dirt accumulation which results from the use of less effective cleaners.

Try Metso Granular on those hard-to-clean pork-kill floors and see for yourself how many man hours can be cut from clean-up time.

PHILADELPHIA QUARTZ COMPANY
Dept. D, 125 S. Third St., Phila. 6, Pa.

metso *Cleaners*



Compact stainless steel dishwashing machine

gives a venturi action and is said to reduce water friction at the tube entrance as much as to 80 percent.

Another device is a simple detector for condenser tube leaks. This consists of a rubber body, one end of which is conical to fit into a condenser tube, with the other end a thin-walled bulb. An air passage connects the bulb with the conical end and a knurled metal sleeve surrounds the body to provide a hand grip. To test a tube one end is plugged, while the shell span is under vacuum. The tube tester is then inserted into the other end of the tube. If the bulb is sucked in the tube leaks. Penetrated tubes are thus quickly and positively located.

Dishwashing Machine 12

A NEW compact dishwashing machine which will handle dishes, silverware, glasses, and glass coffee makers, has been announced by the Paul S. Jones Co., Dept. I, 147 W. 22d St., New York, N. Y. It occupies 6 ft. by 2½ ft. of space and includes a 11 in. Hamilton Beach glass washing sink, a 7½ in. Salvajor bowl washer, a 22 in. Hobart dish washer, a 24 in. x 18 in. floor rack, and a Steril-Sil silver washing and dispenser unit. Also featured are sanitary edges, a 10 in. splash back with a 12 in. hemmed edge, and an 8 in. apron on the sink front.

Radioactivity Probe 13

INSTRUMENT DEVELOPMENT LABORATORIES, Dept. I, 817 East 55th St., Chicago 15, Ill., has developed a portable beta-gamma count-rate meter which is said to be useful in locating radioactive health hazards or in finding stray radioactive materials. The meter has three ranges, 0.2, 2.0, and 20 milliroentgens per hour full scale. A detachable probe on a 4-ft. cable is used for holding the Geiger-Mueller tube. The device readily explores locations not accessible to larger instruments. To distinguish between beta and gamma rays, an adjustable shield on the probe can be set to prevent beta particles from affecting the tube. The instrument is portable and battery-operated, with the battery giving an average operating life of 500 hr. in normal use.

Rotary Pump 14

A NEW, small capacity, positive displacement rotary pump that will handle practically any substance from mayonnaise and very heavy lubricants to boiling water or light gases has been introduced by Ellipse Corp., Pump Div., Dept. I, 24 So. Clinton St., Chicago 6, Ill. Weighing approximately 5 lb. the pump will deliver 2.5 gpm. against a pressure of 1,000 psi. when powered by a 1 hp. motor. It will also operate at a vacuum up to 26 in.

Steam and Water Mixer 15

A STEAM and water mixer, designed to eliminate the necessity of piping hot water long distances, or installing separate water heaters and temperature regulators at isolated points, is produced by Sarco Co., Dept. I, 475 Fifth Ave., New York 17, N. Y. Streamlined to 26 in. in length and 5 in. in width at the head, it has a

Meter locates radioactive materials

liquid-filled, built-in thermostat that insures automatic, sensitive temperature control as set by a key. Hot water capacities of 200 gal. per hour, temperature rise of 50 deg. to 120 deg. F., with a steam pressure of 75 psi. Entire construction is brass with renewable valve heads and seats of stainless steel. Union connection on steam and water inlets. Maximum steam pressure 125 psi. Steam pressure must be at least 20 percent higher than water pressure.

Gantry Crane 16

PORTABILITY, ease in handling and flexibility for many lifting services are features of the 1-ton capacity Gantry crane announced by the Industrial Equipment Co., Dept. I, 315 N. Ada St., Chicago 7, Ill. With a gen-

1-ton capacity gantry crane.

erous safety factor and minimum weight, it has a variety of uses at loading platforms and docks, in power plants, machine shops and factories.

Photoelectric Counter 17

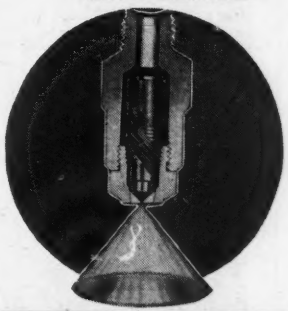
A COMPLETELY packaged, easily installed, general-purpose photoelectric counter is made by Photoswitch, Inc., Dept. I, 77 Broadway, Cambridge 42, Mass. It consists of a photoelectric control, light source, and electric counter. The only equipment which needs to be located at the point-of-count is the control and the light source. One or more electric counters containing the counter face and reset knob, may be placed in any convenient location and wired to the control. The control is easily installed as no wiring is necessary. It has a line cord with a male plug connection which fits any standard lighting outlet. This supplies the power for the light source and electric counter, which in turn have cables and plugs for plug-in connection to the control. The entire combination of equipment can be installed without the help of an electrician. It

SPRAY NOZZLE INFORMATION
CATALOG NO. 22

FOR LOWER SPRAYING COSTS

Surprising as it may seem, spray nozzles alone are often a highly important element in the efficiency of a process or operation involving spraying. Spraying Systems can provide Spray Nozzles that offer two important advantages: (1) design based on a specialized experience in spray nozzle engineering and (2) wide range of sizes to obtain characteristics such as capacity and degree of atomization that meet specifications exactly. Write for Catalog No. 22 . . . gives complete information.

SPRAYING SYSTEMS CO.
4061 W. Lake Street • Chicago 24, Illinois

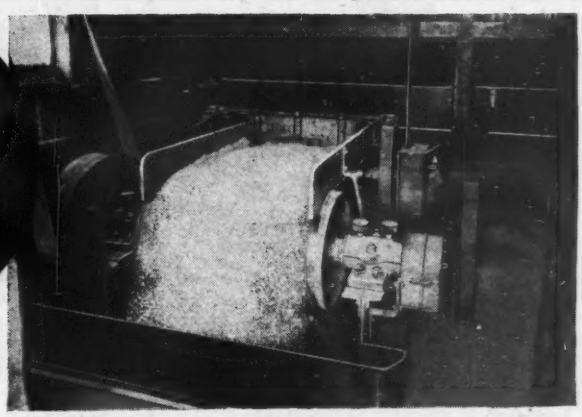


Atomizing Nozzle for Evaporative Cooling

Uniform distribution of atomized spray provides efficient cooling of cans and jars after processing. Available in wide range of sizes for every requirement.

SPECIALISTS IN SPRAY NOZZLE DESIGN AND MANUFACTURE

Safety FROM TRAMP IRON



AUTOMATIC... POSITIVE... DINGS MAGNETIC PULLEYS

Dings Magnetic Pulleys at the head end of conveyor belts provide real safety from tramp iron—eliminate the possibility of damage to processing equipment and contamination of finished products. Separation at full production volume is automatic and positive. Dings Pulley operation costs but a few cents a day for protection you can depend upon for years . . . Remember: There are no more powerful magnetic pulleys built than Dings.

Catalog No. 260 gives complete details on Dings Magnetic Pulleys . . . Ask for your copy today.

DINGS MAGNETIC SEPARATOR CO.
4741 W. McGeogh Avenue, Milwaukee 14, Wisconsin

Dings "HIGH INTENSITY"

"Separation Headquarters Since 1899"

New!
20-Mill
Plastic
Basco-TEX
PLASTIC
APRONS

Will Not Crack or Peel

POSITIVE PROTECTION
against WATER, OIL, ACIDS, ALKALIES

NO LAUNDERING *Just wipe off with a damp cloth. A tremendous cost saver.*

20 MILL PLASTIC
10 Times Stronger than Cloth
Cost only about 1 cent a day

PRICES—COLORS—SIZES

WHITE—
4 Mill Plastic

27 x 36..$ 6.62 per doz.
30 x 36.. 7.53 per doz.
36 x 40.. 7.96 per doz.
36 x 44.. 8.85 per doz.
Full Length Sleeves $6.00 per doz. pair

BLACK or WHITE—
5 Mill Plastic

27 x 36..$ 9.00 per doz.
30 x 36.. 9.75 per doz.
36 x 40.. 11.15 per doz.
36 x 44.. 13.65 per doz.
Full Length Sleeves $10.65 per doz. pair
Leggings, Hip Length $13.10 per doz. pair

MAROON — Heavy Doubled Coated Neoprene

27 x 36..$12.50 per doz.
30 x 36.. 14.00 per doz.
36 x 40.. 18.35 per doz.
36 x 44.. 20.50 per doz.
Full Length Sleeves $12.90 per doz. pair
Leggings, Hip Length $23.50 per doz. pair

BLACK—
12 Mill Plastic

27 x 36..$10.25 per doz.
30 x 36.. 11.15 per doz.
36 x 40.. 14.25 per doz.
36 x 44.. 15.80 per doz.

BLACK — Heavy Double Coated Neoprene

27 x 36..$12.90 per doz.
30 x 46.. 14.00 per doz.
36 x 40.. 18.33 per doz.
36 x 44.. 20.50 per doz.
Full Length Sleeves $12.90 per doz. pair
Leggings, Hip Length $23.50 per doz. pair

BLACK or WHITE—
Extra Heavy 20 Mill Plastic

27 x 36..$14.20 per doz.
30 x 36.. 15.50 per doz.
30 x 40.. 20.15 per doz.
36 x 45...22.60 per doz.
Full Length Sleeves $14.25 per doz. pair
Leggings, Hip Length $25.75 per doz. pair

ALL PRICES F.O.B. Chicago.
Minimum order 1 dozen.
ORDER BY MAIL OR PHONE TODAY
Free Sample Swatch on Request

ASSOCIATED BAG & APRON CO.
218 West Ontario St., Chicago 10, Ill.
Phone SUPerior 5809

is recommended for counting on loading chutes and conveyors, for remote counting, for high speed counting in can and box manufacturing, and for selective counting by height or length.

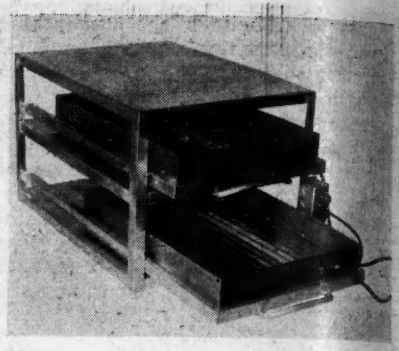
Hydraulic Cylinder 18

A HYDRAULIC operating cylinder for tilting trunnion kettles has been introduced by Lee Metal Products Co. Inc., Dept. I, Philipsburg, Pa. The cylinder is operated by plant water pressure and can be controlled so accurately that a tea cup may be filled from a large kettle without splash or drip. The cylinder has also been installed on the Lee center line scraper agitator kettles for tilting the heavy agitator out of the kettle for cleaning.

Hydraulic cylinder lifts heavy scraper

Conveyor Take-Up 19

A STEEL frame ball bearing take-up for conveyor service has been announced by Dodge Mfg. Corp., Dept. I, Mishawaka, Ind. It incorporates the Dodge SC ball bearing take-up unit consisting of a ball bearing inner unit inclosed in a cast iron housing provided with ways on each side for supporting guides. The housing has a hole for receiving the unthreaded end of an adjusting screw. The take-up has a welded steel frame so designed as to afford ample strength and rigidity without excess weight. Adjustment is accomplished by turning the brass capstan-head nut. Available in shaft sizes from $\frac{3}{4}$ in. to $2\frac{7}{16}$ in. inclusive.



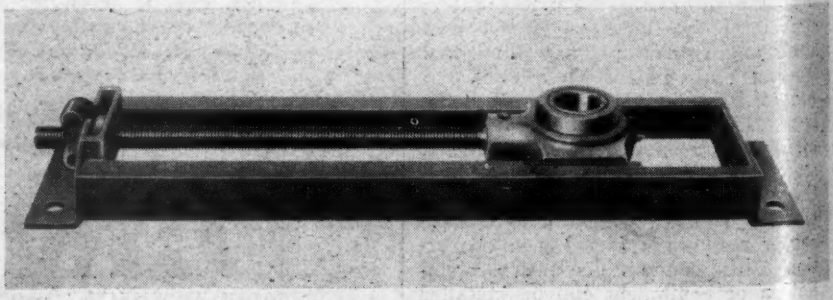
Infrared heater for low temperature drying

Infrared Dryer 20

FOR producing thermostatically controlled temperatures up to 380 deg. F., for low-temperature drying applications, Delt-Calesco Co., Dept. I, Far Hills, N. J., is offering a new infrared preheater which is built in the form of an open framework containing drawers that are separately removable from two sides. The bottoms of these drawers consist of aluminum-carbon alloy heating elements fused in tempered glass, which are said to produce an even over-all plate temperature. Materials may be placed above or below a plate, or rest directly on its surface. The unit is designed to allow ready escape of released moisture.

Disc Floor Machine 21

AN extra-low disc-type floor machine for polishing, scrubbing, steel wooling and other maintenance, has been introduced by the G. H. Tennant Co., Dept. I, 2530 N. 2nd St., Minneapolis, 11, Minn. Feature of the machine is a special side-polishing brush which cleans and polishes flush with the walls, even polishing the baseboard. The brush, which has bristles extending beyond the circumference of the disc and approximately 2 in. high, eliminates bumping and scratching furniture. The machine has an over-all height of less than 12 in. It has a handy wheel adjustment which allows it to operate with 50 percent of the weight on the wheels, or with the full pressure on the brush. Three-inch wheels swing up automatically when the handle is tilted for concentrated weight position. The machine accommodates 15-in. accessories for dry cleaning and burnishing with steel wool, for polishing and scrubbing, and for rug cleaning. A steel tank on the machine handle holds water and soap



Ball bearing take-up for conveyor service

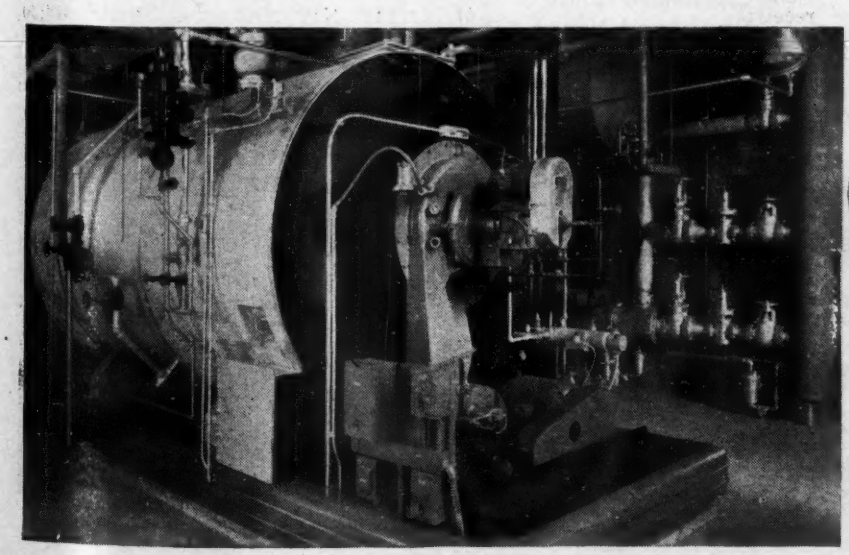
There are More "Packaged" Cleaver-Brooks Steam Generators Serving a Wider Range of Steam Needs than any other make

EXPERIENCE of Cleaver-Brooks in the installation of steam generators extends into widely different fields and uses. From aircraft plants to dairies, bottling plants, laundries, manufacturing, food and processing plants, Cleaver-Brooks has met varying steam needs at low cost and with exceptional efficiency of equipment.

Whatever your business — whatever your operation — you benefit from Cleaver-Brooks experience. Your steam generating equipment is planned to meet not only present loads, but to provide for future expansion as well.

Check your operating budget . . . do your steam generating costs seem excessive? Cleaver-Brooks will be glad to work with you to see if they can be substantially and profitably lowered.

CLEAVER-BROOKS COMPANY
327 E. Keefe Avenue, Milwaukee 12, Wisconsin



Custom-planned —

Every Cleaver-Brooks Steam Generator is built to the measure of an individual plant's needs, and Cleaver-Brooks assumes full responsibility for the satisfactory selection and initial operation of the unit.

A qualified engineer analyzes load conditions, space and machinery arrangements. After installation, a factory engineer puts the steam generator into operation and trains plant employees on its operation, care and maintenance.

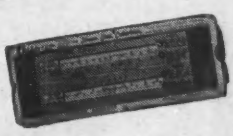
Self-contained and "packaged"

Delivery consists of a "packaged" unit. Connections to service outlets are all that is needed. No smokestack is used—a simple vent carries away all products of combustion. No extra foundation is required. Compact—the unit fits into limited space and low headroom locations. Sizes: 22 models—15 to 500 hp; pressures 15 to 200 lbs. p.s.i.

Money-making performance —

The Cleaver-Brooks Steam Generator is designed for easy operation and low upkeep cost. Operation is at 80% efficiency from full load down to 30% of its rating. The high heat transfer from the 4-pass, down-draft boiler produces fast steaming. A boiler room as clean as the home or office is possible through use of oil for fuel.

Cleaver-Brooks
STEAM GENERATORS

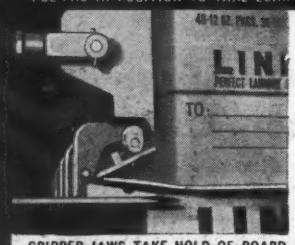


WRITE on your business letterhead
for the Free Steam Cost-Calculator—a ready-reference slide rule showing the comparative steam costs when using oil or coal as fuel.

"SENSATIONAL!" was the word . . .

PUL-PAC IN POSITION TO TAKE LOAD

1



2 GRIPPER JAWS TAKE HOLD OF BOARD

3 PULLING THE LOAD ONTO CARRIER PLATE

4 LOAD IN POSITION FOR TRANSPORTING

5 LOAD IN FREIGHT CAR FOR SHIPMENT

. . . used by Top-Management men to describe the new "PUL-PAC" method introduced at the National Material Handling Exposition by CLARK TRUCTRACTOR.

Why? . . BECAUSE IT . .

- √ employs an inexpensive load base of paper, fiberboard or similar material
- √ makes possible maximum utilization of storage space
- √ reduces shipping costs
- √ handles assembled units on original load base through the entire movement cycle
- √ There are many other reasons — just write

CLARK TRUCTRACTOR

Division of CLARK EQUIPMENT COMPANY

BATTLE CREEK, MICHIGAN

OTHER PLANTS — BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN

Other CLARK Products

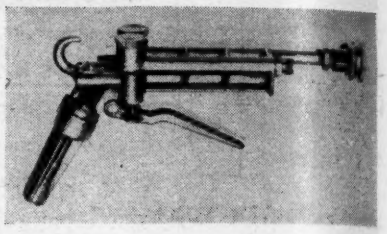
FORK LIFT TRUCKS
TOWING, DUMP AND SHOVEL TRACTORS
RAILWAY TRUCKS
DRILLS & GEARS
ELECTRIC STEEL CASTINGS
METAL SPOKE WHEELS
AXLES & HOUSINGS
TRANSMISSIONS

Prices on CLARK products will not be advanced in excess of increased costs.

solution for scrubbing. The liquid feeds to the center of the brush at the flick of a lever and flows uniformly through the bristles. Weight of machine equipped for use is about 100 lb.

Air and Water Gun 22

DESIGNED for economical, time-saving high-pressure rinsing and removal of loosened dirt and grease from inaccessible parts of equipment and machinery, a lightweight air and water gun, that is completely controlled by a finger-tip lever without the necessity for valve adjustments, has been introduced by Turco Products, Inc., Dept. I, 6135 S. Central Ave., Los Angeles 1, Calif. It operates on regular air and water pressures and connects to standard fittings.



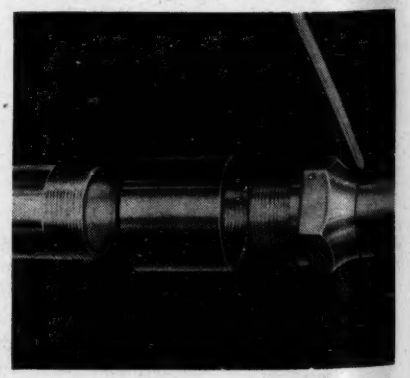
Light weight gun for high pressure rinsing.

Glass Tubing Cutter 23

A GLASS tubing cutter for scoring or grooving Pyrex tubing up to ½ in. O.D. and soft glass tubing up to ⅝ in. has been announced by E. Machlett & Son, Dept. I, 220 East 23rd St., New York 10, N. Y. It is equipped with a 5-in. steel wheel; a crystalon wheel ⅛ in. thick is also provided. Wheel speed is 3,400 rpm. through a V-belt drive. Overall dimensions 9 in. high, 10½ in. wide and 16 in. long. Operates on 100 v. 60 cycle d.c.

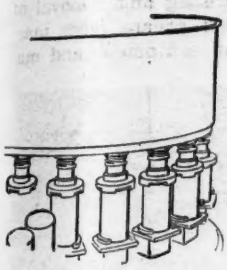
Stainless Steel Adapter 24

THIN-WALLED stainless steel tubing may now be used in many piping installations where standard IPS stainless pipe is also used, due to a new stainless adapter fitting announced by the Electric Steel Foundry, Dept. I, 2141 NW 25th Ave., Portland 10, Oregon. The use of this adapter permits the incorporation of stainless tubing in lighter take-off systems from an already established standard pip-



Stainless steel adapter fitting

A reputation is at stake!

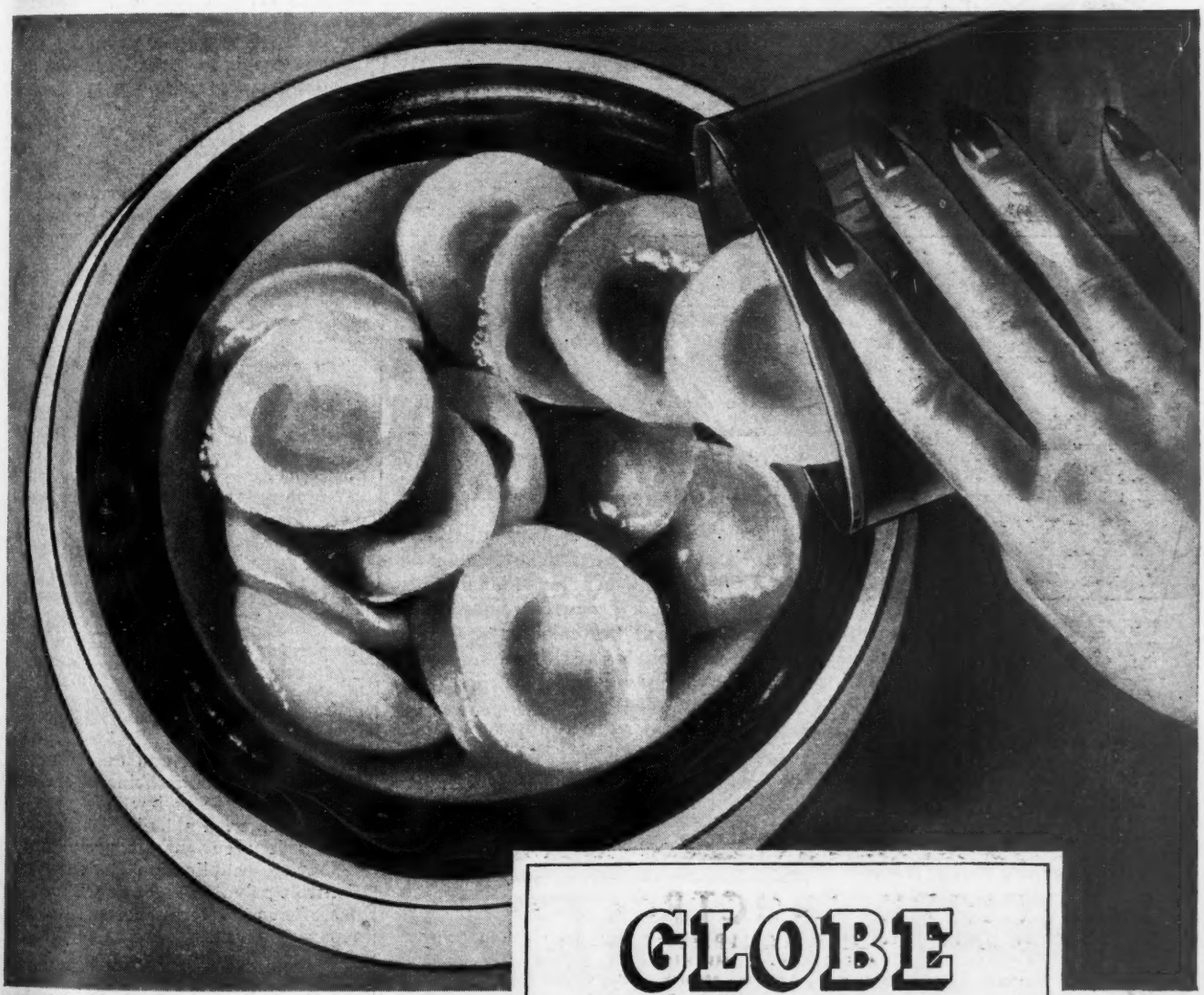


Every time Mrs. American Housewife opens a package of processed food, the reputation of the processor is at stake, for Mrs. Housewife expects the contents to measure up to her confidence in the label. As every food packer knows, reputations are safeguarded best by scrupulous care in the processing of products.

Stainless steel tubes in processing equipment have long been relied on as a first line of defense against unwanted chemical reactions, product contamination and the dangers of corrosion.

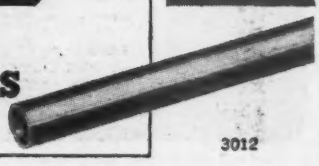
Knowing how to use stainless steel tubes to gain the most in protection calls for specialized "know-how", for just any analysis of stainless steel won't do for all applications. Consult with Globe — as specialists in tubing manufacture and a broad experience record in stainless steel tubing (both seamless and welded) applications we offer valuable technical advisory service to both builder and user of processing equipment.

Globe Steel Tubes Co. • Milwaukee 4, Wisconsin



Write for Bulletin No. 115 and complete information on Globe Seamless Stainless Steel Tubing and Gloweld Welded Stainless Steel Tubing.

GLOBE
Stainless
STEEL TUBES



3012

Flat Wire stainless steel belt, 40" wide, ½" x 1" mesh, sprocket drive. Carries glass-packed food through rinse tank.

CYCLONE can probably furnish a metal conveyor belt that's *right* for your job because Cyclone makes *three* types of belts (Flat Wire, Chain Link and Flex-Grid) in a wide variety of metals, alloys, and finishes. Our knowledge and experience cover 25 years of making metal conveyor belts for industrial uses . . . assurance that your problem will be correctly analyzed, and the *right* U·S·S Cyclone Belt specified. Cyclone's reputation for quality is your guarantee of satisfaction.

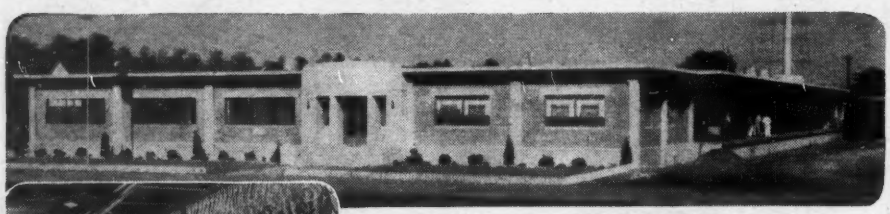
Our technicians will gladly help you plan your new belt installation. Write for our free catalog No. 3. Or call the nearest Cyclone office. Offices in principal cities . . . factories in Mid-West and on Pacific Coast.

CYCLONE FENCE DIVISION · American Steel & Wire Co. · USS CYCLONE "Red Tag" METAL BELTS · UNITED STATES STEEL

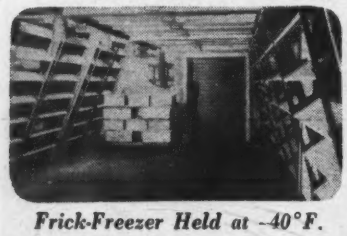
By the makers of Cyclone Fence

CYCLONE FENCE DIVISION
(AMERICAN STEEL & WIRE COMPANY)
Dept. H-37, Waukegan, Illinois
United States Steel Export Company, New York

UNITED STATES STEEL



Processed Chickens in 35° Room



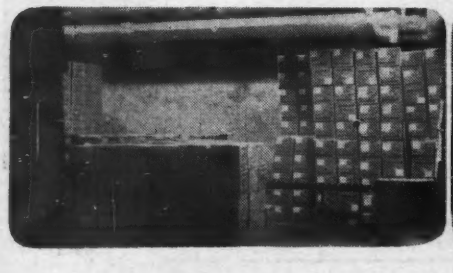
Frick-Freezer Held at -40°F.

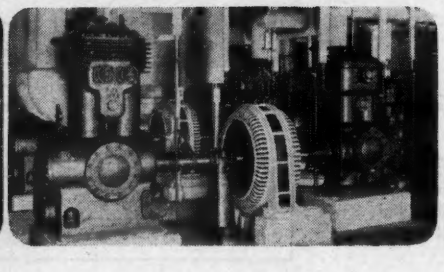
Zero Storage and Refrig. Machines

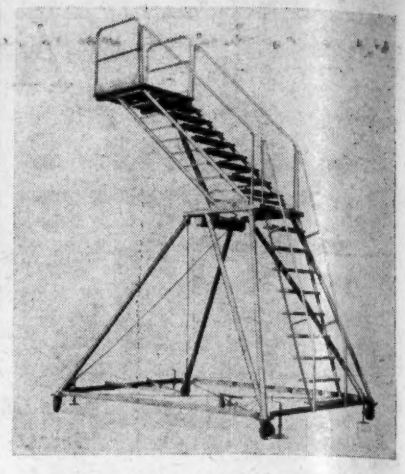
How to Quick-Freeze 6000 Chickens a Day—

Birds Eye-Snider Division, General Foods Corporation, do it at their new $800,000 plant in Pocomoke City, Md., by keeping 45,000 birds on hand, using conveyor processing lines totaling 1500 ft., precooling the chickens to 35°F., quick-freezing at temperatures down to minus 40°, and storing at zero. • Frick refrigeration carries the entire cooling load. Installation by Mollenberg-Betz Machine Co., Frick Sales-Representatives at Buffalo. • Let us quote on that Frick-Freezer YOUR community needs.

DEPENDABLE REFRIGERATION SINCE 1882 · FRICK CO. · WAYNESBORO, PENNA. U.S.A.







Hydraulically elevated workstand

ing layout, and also makes practical the use of tubing in place of the more costly standard stainless steel pipe in making installations where tubing would be equally suitable in other respects. The tubing is butt-welded to the adapter, and thus is permanently fitted with standard pipe threads and can be assembled as any pipe. A system using this method is readily dismantled for cleaning or inspection.

Adjustable Work Stand 25

A PORTABLE 16-sq. ft. work platform, with a maximum static load capacity of 1,500 lb., that can be hydraulically elevated or lowered to any working level from 3 to 24 ft., is now available from Airquipment Co., Dept. I, Burbank, Calif. Called Aerostands, the units feature automatic and self-adjusting steps which maintain their position parallel to the ground regardless of the working angle of the stand. All models are equipped with guard rails and skid-proof surfaces on platforms and steps. Frames are constructed of welded tubular steel mounted on swivel caster with caster locks. Truck locks are provided to hold stand stationary when in service.

Refrigeration Controls 26

A LINE of refrigeration pressure and temperature controls featuring 2-pole construction was recently announced by Penn Electric Switch Co., Dept. I, Goshen, Ind. Designated as the 270 Series, it includes single temperature, low side pressure, and dual controls. The dual controls combine in one unit the temperature or low side pressure mechanism with a built-in high pressure safety cut-out. It provides the following application advantages: Controls polyphase motors without the use of line starters; incorporates two separate circuits necessary for the control of single phase multiple systems or polyphase systems when one pole is used as a pilot control; when wired as a 2-pole switch in single phase circuits, it always breaks the "hot" line; controls two separate load circuits such as two single phase motors or any other combination.

CATALOGS, BULLETINS

This digest of manufacturers' new publications is offered by FOOD INDUSTRIES Reader Service as a convenience for executives. The editors feature catalogs, data sheets and technical pamphlets likely to interest purchasing agents, superintendents, packaging men and food technologists.

Food Plant Equipment

Glass Piping 51
Making Field Joints with Pyrex Brand Pipe is the title of Bulletin 1A-22 recently issued by Corning Glass Works. It contains instructions and illustrations of the step-by-step procedure in field fabrication of Pyrex tubing for food and beverage plants, and describes the field flanging kit that can be bought or rented.

Deaerators 52
Deaerating heaters and vacuum deaerators manufactured by Liquid Conditioning Corp. are described in Bulletin 2 which outlines the applications and principles of operation of these units, and explains the special advantages of the Liquon designs. Illustrated with line drawings.

Dust Recovery System.....53
Advantages of Buell (van Tongeren) Cyclones in Industrial Dust Recovery Systems is the title of bulletin G-842 issued by Buell Engineering Co., Inc. Contains a complete description of the systems, and an explanation of the theory and operation of the van Tongeren cyclone.

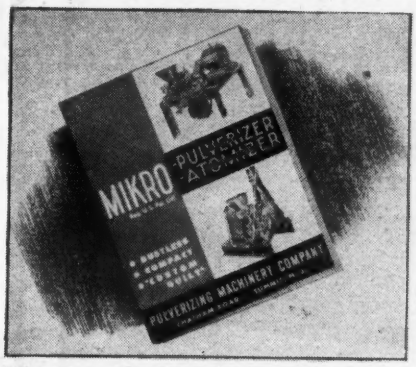
Cooling Towers 54
The Marley Co., Inc.—4-page bulletin G-47, describing and illustrating large and small induced draft and atmospheric spray towers, spray ponds and spray nozzles.

Chemical Porcelain 55
Illinois Electric Porcelain Co.—8-page illustrated catalog featuring the chemical porcelain manufactured by this company. Includes sizes and descriptions of porcelain pipes, fittings, expansion joints, valves, flanges, ejectors, Raschig rings, and special shapes.

Industrial Fans 56
Sutorbilt Corp.—4-page folder No. 63A, "Industrial Fans," contains illustrations of various suction and pressure fans, tables of performances and dimensions. Bulletin No. 59C—Ball bearing, positive pressure blowers, gas pumps and vacuum pumps, with illustrations and tables of capacities. Bulletin No. 62—Air Conveyors. Illustrates methods of moving materials by suction and by pressure.

Corrosion-Resisting Equipment 57
A 20-page bulletin, general catalog H, recently published by The Duriron Co., Inc., gives a general description of each type of corrosion-resisting equipment provided by the company. It explains the composition and applications of Duriron, Durichlor, Durimet and Chlorimet, and tells what Durco alloys each piece of equipment is available in; gives sizes and capacities and tells the reader what bulletin to request for complete details on any particular piece of equipment.

Pulverizing Machinery 58
A new, fully illustrated, 48 page book, just released by the Pulverizing Machinery Co., describes the complete line of Mikro-Pulverizers and Mikro-Atomizers, from the small Sampler and Bantam Models for laboratory and pilot plant use to the large capacity units for full-scale production operation. Basic principles and details of design and construction are presented as well as various modifications available for special conditions of operation. Typical applications of this equipment to various pulverizing operations are noted and representative performance figures are quoted.



The company's test grinding and research facilities for analyzing and reporting on clients' specific grinding problems are described.

Water Softener 59
Cochrane Demineralizers is the title of a 12-page bulletin, Publication 4181 by Cochrane Corp. Describes, together with line drawings and photographs, the function, method of operation, results to be expected and the theory of their system for demineralizing water.

Variable Speed Drive.....60
Graham Transmissions, Inc.—Bulletin No. 510 on "The Graham Variable Speed Drive". Contains installation photographs, sectional drawings and descriptions of standard and geared head types for variable speed drives with built-in and coupled motors. Also dimensional drawings and tables of specifications.

Canning Machinery 61
A new letter file size, loose leaf catalog that is illustrated with photographs and sectional drawings, and contains engineering data, tables and valuable information on canning machinery, has been announced by the Sinclair-Scott Co. Ordering of parts is made easy and fool-proof by numbered sectional drawings and indexed parts lists.

Pressure Filters 62
Oliver United Filters, Inc.—4-page Bulletin 123 R on Oliver Pressure Filters for filtering chemicals, dyes, fruit juices, sirups, wine and beer. Contains photographs, line drawings, descriptions and data.

Fluid Drive 63
American Blower Corp.—Bulletin 8019 on Type VS Class 6 Gyrol Fluid Drive, designed especially for the heavy duty required of 3600 rpm. boiler feed pump drives. Describes and illustrates the fluid power flow principle and action of the speed controller. Also contains chart illustrating power saving which results from lower pressure and improved pump action achieved by adjustable speed fluid drive.

Germicidal Lamps 64
Tru-Air Ultraviolet Products Co.—8-page bulletin No. 79 entitled "Protect Your Products with New Ultraviolet Germicidal Rad-i-Air." Suggestions are offered for ultraviolet germicidal treatment in the meat, bakery goods, beverage, dairy products, fruit and vegetable and other industries. Descriptions and specifications of "Bare Lamp," "All-Purpose" and "Conveyor Line" units are included.

Heat Exchangers 65
Davis Engineering Corp.—4-page bulletin No. HE-100 on "Paracoil"—a self-cleaning tubular heat exchanger designed for continuous operation processes. Contains cutaway photograph and sectional drawing of shell-and-tube design with a tube bundle of the bayonet type that eliminates the necessity for expansion rings or floating tube steel head.

Materials Handling

Conveyors 66
Island Equipment Corp.—4-page, two-color bulletin—GP-34—covering Styl-O-Matic pickle, olive and sauerkraut packing and conveying units.

Pumps 67
The Quimby Pump Division of the H. K. Porter Co., Inc. has released an 8-page pamphlet, Bulletin 300-A, on the Model Q close-coupled centrifugal pump, designed for general service with capacities from 10 to 100 g.p.m. Contains selection tables, dimensions and construction features.

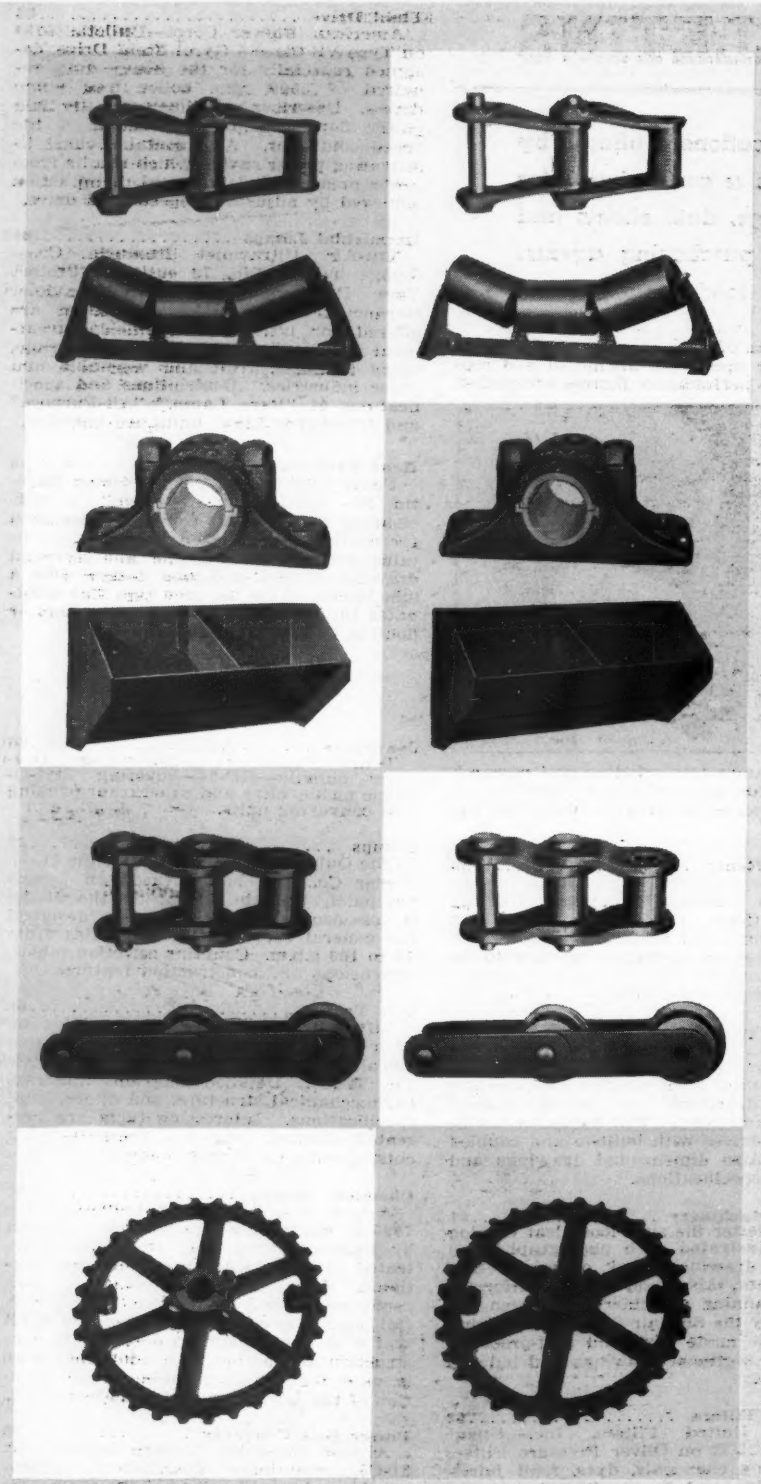
Lift Trucks 68
Lift Trucks, Inc. announces publication of a new six page catalog devoted specifically to the Motorized HydroLectric Lift Truck. Detailed diagrams illustrate the mechanical structure, and dimensional specifications. Interesting facts are presented showing how this versatile truck cuts operation and maintenance costs.

Chemical Pumps 69
A new 10-page 2-color bulletin Form 7095 on chemical pumps has been released by Ingersoll-Rand Co. It is well illustrated with exploded views and cross sectional drawings, and contains both performance and dimensional tables. A full page is devoted to the Cameron shaft seal with illustrations to describe its construction and action. An additional page is used for the description and illustration of the Leakollector stuffing box gland.

Power Belt Conveyor 70
A new two-color 32-page catalog No. 31-C5, containing descriptions, photographs and specifications of the company's entire line of power belt conveyors has just been issued by the Rapids-Standard

HOW TO GET THIS LITERATURE

Food Industries Reader Service now supplies tear-out coupon cards for your convenience in requesting copies of these new publications from manufacturers. Use one or more of the cards on the colored sheet bound near this page. Fill out, tear out, mail out and the Reader Service staff will see that your requests reach the manufacturers.



JEFFREY REPLACEMENT PARTS ARE *Exactly* LIKE ORIGINAL EQUIPMENT

Put them side by side . . . they look alike. Put a new one in place of the old . . . they fit . . . they act alike . . . they ARE duplicates.

When normal wear necessitates replacement, be sure to specify Jeffrey parts. They are made to exact specifications, possess the same high quality of original equipment, plus many new improvements which Jeffrey engineers and metallurgists have developed in the meantime.

THE JEFFREY MANUFACTURING COMPANY

ESTABLISHED 1877

927-99 North Fourth St., Columbus 16, Ohio

Baltimore 1 · Birmingham 3 · Boston 16 · Buffalo 2 · Chicago 1 · Cincinnati 2 · Cleveland 13 · Denver 2 · Detroit 13 · Huntington 19 · Jacksonville · Milwaukee 11 · New York 7 · Philadelphia 3 · Pittsburgh 22 · St. Louis 3 · Salt Lake City 1 · Scranton 3

Complete Line of Material Handling, Processing and Mining Equipment

Co. Inc. Illustrated are the portable Challenger and Defender models of the Rapid Power Booster; the portable Stevedore, Jr.; the permanent installation-type Floor-Veyor; various applications of these models as horizontal belt conveyors; and the Press-Veyor. Detailed drawings and close-up photographs show points of construction, and complete specification tables accompany each model.

Chemical Pumps 71
Milton Roy Co.—28-page catalog No. 146 describing Milton Roy Pumps for controlled volume pumping in volumes as small as 1 pint per hr., at pressures as high as 20,000 lb. per sq.in., and for handling difficult materials and corrosive chemicals. Contains a section on Automatic Volume Control, capacity-pressure selection tables and color charts to assist in the selection of the proper materials of construction for the pumps and other equipment.

Plant Supplies

Flooring 72
Walter Maguire Co., Inc.—Bulletin No. 602. New book that illustrates and describes the Emeri-Crete flooring made with emery aggregates.

Gaskets 73
Flexitallic Gasket Co.—2-page pocket size booklet describing Flexitallic gaskets for sealing steam and other fluids under pressure. A number of diagrammatic sketches are used to illustrate the application of these gaskets to high pressure steam joints.

Wire Cloth 74
Technical Information on Wire Cloth and Metallic Screens is the title of a new reference book recently issued by The Cambridge Wire Cloth Co. Contains information on the wire cloth and filter segments produced by the Cambridge fabricating shops.

Cooler-Proof Glue 75
Paisley Technical Service Bulletin No. 15 describing an improved cooler-proof glue has just been released by Paisley Products, Inc. This glue provides ideal protection for all labeled glass packed products which are subjected to wet storage, high humidity and water immersion. It handles hot, cold, wet, and greasy bottles and jars at higher machine speeds, and fills a need in food and soft drink plants, breweries and similar manufacturers. Price schedule, available packings, and complete instructions are given.

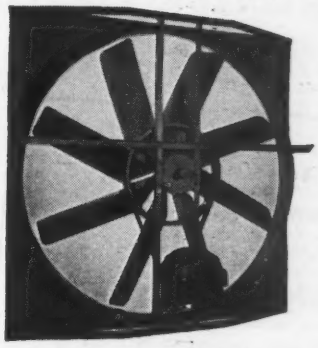
Control Equipment

Liquid Level Gages and Valves 76
Jerguson Gage & Valve Co.—36-page catalog describing their complete line of liquid level gages, valves and engineering specialties. Contains photographs, line drawings and cut-away views, together with detailed descriptions, dimensions and prices.

Pulse Timer 77
The R. W. Cramer Co., Inc.—Bulletin #1600, describes and illustrates the Type V Pulse Timer, designed to repeat continuously electrical impulses of a definite set duration at the end of successive identical time intervals, the length of which may be readily adjusted over the dial range of the instrument.

Temperature Regulators 78
Bulletin No. 464—a new 24-page booklet: "Engineering, Operating and Maintenance Data on Temperature Regulators and Controllers" has just been issued by Leslie Co. Construction details of each class or type of regulator or controller are shown in detail in large cross-sectional color illustrations; 800 Brinell hardened stainless steel main valves; corrosion resistant springs, hardened stainless steel

Employees are More Productive
WITH
Coolair
TRADE MARK
EXHAUST FANS



SUCCESSFUL MANAGERS have discovered that vitalizing *fresh air*, steadily moving through offices and work rooms, is an important factor in developing maximum worker efficiency. It may be that YOUR plant, like many others, is merely in need of better ventilation to bring present employees to the very peak of their efficiency.

COOLAIR EXHAUST FANS, similar to the illustration, are now available in 16 sizes, with certified air delivery capacities ranging from 6,200 to 48,000 cubic feet per minute! This amazing size flexibility provides the means of scientific ventilation in all types of applications.

YOUR COOLAIR DEALER, or agent, will be glad to make a survey of your building without obligation to you. Call him in today, or write.

ENGINEERS and ARCHITECTS
For descriptive and technical data see:
SWEET'S CATALOG FILE Architectural
SWEET'S CATALOG FILE for Builders
A. S. H. V. E. GUIDE
ELECTRICAL BUYERS REFERENCE

AMERICAN COOLAIR CORPORATION
Pioneer Manufacturers of V-Belt Drive Exhaust Fans
3604 Mayflower Street — Jacksonville 2, Florida

THE GUESS IS OUT WHEN YOU MEASURE YOUR VALUABLE STORED LIQUIDS WITH
LIQUIDOMETER Tank Gauges

100% AUTOMATIC
FOR GAUGING LIQUIDS OF ALL KINDS
APPROVED BY UNDERWRITERS LABORATORIES
WRITE for COMPLETE DETAILS

"LIQUIDS WORTH STORING ARE WORTH MEASURING"

THE LIQUIDOMETER CORP.
38-14 SKILLMAN AVE., LONG ISLAND CITY, N.Y.

Wherever you go — whatever you do
You use products made better with BECKMAN pH CONTROL!

Did You Know These Beckman pH Facts?

...that Beckman pioneered modern glass electrode pH equipment, transforming the cumbersome laboratory apparatus formerly used into a compact, practical, portable instrument that paved the way for today's simplified pH measurement and control?

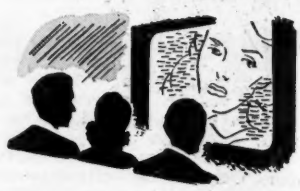
...that the first completely automatic glass electrode pH indicator, recorder and controller was pioneered by Beckman? Operating entirely without batteries, this instrument made automatic process control accurate, convenient, practical—and is today widely used in all parts of the world.

...that Beckman pioneered the High Temperature Glass Electrode system which, for the first time, enabled continuous pH measurements to be made at temperatures up to 212°F (100°C)? This electrode system is of tremendous value wherever hot process fluids must be controlled.

...that the High pH Glass Electrode system is also a Beckman development? This unique glass electrode unit can be used to measure high pH values even *in the presence of sodium ions*... and extends the usefulness and accuracy of glass electrode equipment to many industries where alkaline solutions in combination with sodium ions have heretofore presented difficulties.

...that the above are only a few of many developments that make Beckman pH Equipment the most advanced, the most accurate, the most adaptable in the field of pH?

The tires you ride on are made with the aid of Beckman pH Control. It was found that coagulation of the synthetic rubber is very sensitive to variations in the pH (acidity or alkalinity) of the processing solutions. Therefore, Beckman Automatic pH Equipment is used to control these processes for efficiency and economy.



The motion pictures you see are processed with the aid of Beckman pH Control. The developing laboratories of the major motion picture studios discovered that Beckman pH Equipment gives better control of the quality and uniformity of the film developing processes, insures clearer prints, less waste and better projection qualities.

The water you drink is probably Beckman pH Controlled. In more and more municipal water systems, purification of the drinking water is being regulated with the aid of Beckman pH Equipment, thus insuring a water supply that is both pure and uniform—plus important savings in treating costs.

The food you eat is another item that, today, is made better and more uniform with the aid of Beckman pH Control. It has been found that virtually all types of food processes—from baking crackers to canning meats—are performed more efficiently, more economically with the aid of Beckman pH Equipment.

Are YOU Using This Cost-Cutting Tool in Your Plant?

ONLY A FEW YEARS AGO pH control was more of a laboratory curiosity than a cost-cutting industrial tool. But today—largely through the far-reaching developments of the Beckman research staff—modern pH control has become an indispensable tool for speeding chemical processes, safeguarding quality, reducing waste and simplifying production operations throughout industry. *In fact, wherever there's water there's pH...and wherever water or water processes are used, chances are the job can be done quicker, better, at lower cost with Beckman pH Control.*

How About Your Product?

The above are but a few of the innumerable ways alert industries are cutting costs, improving product quality, reducing waste and making other vital savings with Beckman pHControl. Have you investigated the vital savings it can make in *your* operations? Our engineers will gladly study *your* pH problem and suggest ways that Beckman pH Control can save money for you. *Beckman Instruments, National Technical Laboratories, South Pasadena* 18, *California.*

FREE...

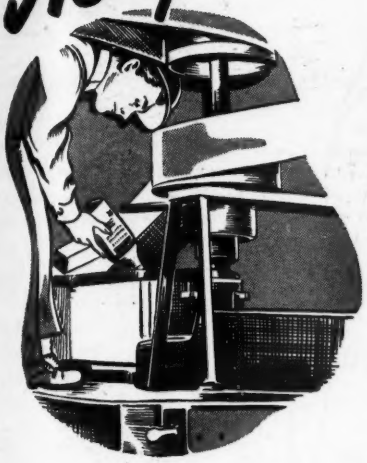
"What Every Executive Should Know About pH"

Helpful, informative, non-technical. Send for your copy.

BECKMAN INSTRUMENTS CONTROL MODERN INDUSTRIES

FOR FREEDOM FROM ALL INSECTS USE

*Acrylon**



the latest development in "SPOT" fumigants

Especially developed for direct application to food-processing and handling machines in flour mills, bakeries and similar food-processing plants. ACRYLON vaporizes completely after application and is toxic to all insects—insures maximum kill at minimum cost. Furthermore, it leaves no residues and does not adversely affect food products in any way.

Correct dosage data on the label plus the fluid-ounce graduations on the bottle make ACRYLON easy to measure and apply.

ACRYLON airs out rapidly from machinery and products and creates no fire hazard. Write for detailed information.

*Reg. U. S. Pat. Off.

LIQUID HCN is the ideal fumigant for all general, building-wide insect and rodent control. Complete information on request. To keep insect infestation at a constant minimum level, supplement LIQUID HCN fumigations with periodic applications of ACRYLON in strategic spots.

American Cyanamid Company

Agricultural Chemicals Division

30-X ROCKEFELLER PLAZA • NEW YORK 20, N. Y.

Keep your plant insect-free at all times with LIQUID HCN and ACRYLON

cylinder liners and controlling valves; phosphor bronze and monel diaphragms. Both self-contained regulators and external-pilot-operated controllers are featured. Included also are sizing and capacity tables to guide the selection of the proper regulator or controller for specific applications. Instructions for installing, operating, dismantling, cleaning and assembling are presented in an easily-followed sequence.

Thermometers and Pressure Gages... 79

The Brown Instrument Co. has recently issued a new catalog No. 6707, on its rectangular case thermometers and pressure gages. Vapor, gas and mercury actuated thermometers and pressure gages are illustrated and described, and there is a large cut-away illustration featuring the design improvements found in the thermometers and gages, with each part clearly labelled for easy identification. Bulbs, charts and interchangeable cases are fully treated.

Stop Watches 80

Meylan Stop Watch Corp.—6-page catalog covering the stop watches manufactured by this company.

Flame Control 81

The Mercoid Corporation.—Bulletin V-8 on the Mercoid Visaflame oil burner control system actuated by light. This 8-page bulletin contains illustrations of the Visaflame bulb and controls, line drawings showing principle of operations, descriptions and instructions for installing the system to obtain perfect oil burner performance.

Miscellaneous

Better Farming 82

Better Farming Through Research—20-page illustrated bulletin devoted to the improvements in farming made possible through Shell Oil Company's agricultural research at their modern agricultural laboratory and experimental station near Modesto, California.

Pipe Insulation 83

Mystik Adhesive Products. — 6-page pocket size folder describing and illustrating Dri-Pipe insulation used to prevent pipes from dripping.

Laboratory Equipment 84

Scientific Glass Apparatus Co. Inc.—6-page catalog describing Gyco laboratory heating jacket, Gyco Pyro-tran and vacuum distilling apparatus. Includes illustrations, graphs and prices.

Rat Poison 85

Government Chemical Products Co. has released literature which describes Rodust, a powder made with the new sensational raticide ANTU that kills rats by contact. Folder describes composition of new chemical, how to use it, its toxicity to rats yet harmlessness to household pets and chickens.

Insecticides 86

Sprout, Waldron & Co. announce the availability of a completely revised bulletin, I-846, covering the intimate blending of dust insecticides and similar fine powder formulas. The notable progress made during the past two years in this and other industries, as well as many new indicated applications of this unusual method are indicated.

Time-Saving Tools 87

Crozier Machine Tool Co.—Illustrated 12-page catalog 46-1, describes and illustrates the features and operation of Crozier time-saving tools, including various models of the vacuum-grip speed lathe for odd shaped parts that cannot be held by chuck or collet, tool post turrets equipped with cutting-off tool and holder, collet attachments, collets and surface plates.

If you have HIGH TIDE...

. . Or a FISH POND in your BASEMENT . . .

Use STONTITE

Return the coupon for FREE FOLDER . . . *no obligation.*

STONHARD COMPANY

Building Maintenance Materials

Serving Industry Since 1922

Terminal Commerce Bldg.
Philadelphia 8, Pa.

STONHARD COMPANY
Term. Com. Bldg., Phila. 8, Pa.
Send us a free copy of the folder including details about STONHARD STONTITE.

Firm .....

Mr. .....Title .....

Address .....

City .....Zone..State .....

VOL. CXXVIII. NO. 136 ★

Food Fight

Grocery Men Gird for Battle Ahead to Get Housewives' Business

Will Try Every Tactic From Penny Sales and Bigger Staffs to "Prefab" Pie

Plan Courses for Salesmen

BY JOSEPH M. GUILFOYLE

Men who make and sell groceries are getting ready to fight for the housewife's business.

They're practicing up on all their pre-war wiles, from door-to-door sample distribution to the penny sale.

Reprinted from a recent issue of WALL STREET JOURNAL

ARE YOU READY FOR THE SLUGGING MATCH?

VITAMIN ENRICHMENT may help your product meet the heavy competition ahead. Today Mrs. Homemaker uses vitamin enrichment as a guide in judging the quality and food value of the products she buys. Investigate the possibilities for your product. Consult our technical experts.

ROCHE VITAMIN DIVISION

HOFFMANN-LA ROCHE, INC., NUTLEY 10, NEW JERSEY

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

SUGAR

Sweetness of Invert Sugar

THAT completely inverted sugar is neither 10 percent sweeter nor 10 percent less sweet than cane sugar is the conclusion drawn from experiments carried out recently in an attempt to determine the desirability of using invert sugar in carbonated beverages.

In the first experiments, a typical carbonated beverage was taken and enzymes added to ½ the batch. At the end of 24 hr. all of the sugar in the enzyme-containing batch was found to be inverted. There was no inversion in the untreated batch. No difference in sweetness between the two batches could be detected by any of the 40 judges.

To determine more accurately the comparative sweetness, a solution containing 10 percent cane sugar in distilled water was made up. One half of this was inverted. The two solutions were compared by the 9 best tasters, whose ability to detect a change of ± 10 percent in a 10 percent sucrose solution had been previously determined. In no case were the tasters able to distinguish a difference in sweetness.

Digest from "Estimation of the Comparative Sweetness of Sucrose and Invert Sugar," by M. T. Miller, at meeting of Georgia Section, American Chemical Society, Atlanta, Ga., October 23, 1946.

FRUITS

Sweetening from Fruit

PREPARATION of sweetening media from fruit, with incidental removal of impurities and color, is disclosed in a recent patent. Essential steps in the process are: addition to the ground fruit pulp of a sufficient quantity of acid, preferably phosphoric, to materially reduce the pH; after which an alkaline material, preferably hydrated lime, is added to raise the pH above 10 followed by a second addition of acid. This results in the formation of a granular, easily washable and filterable precipitate, from which the sweetening medium can be separated by vacuum filtration. In processing pears, for example, the pulp with about 10 percent by volume of water had a pH of 4.9 which was reduced to 3. Lime solution was added until the pH of the mixture was increased to 11.3. When the reaction with lime was complete the pH was reduced to 7.8 by the addition of phosphoric acid. During these operations the temperature of the mixture was below 130 deg. F., but thereafter it was raised to boiling. A granular precipitate resulted that was readily separated by vacuum filtration, yielding a clear solution. This was decolorized by bone char. The sirup contained 84 percent of the sugars in the pears.

Digest from U. S. Patent 2,408,418, issued October 1, 1946, on an application dated September 11, 1942, to A. M. Erickson and J. D. Ryan, and assigned to Barron-Gray Packing Co., San Jose, Calif.

VITAMINS

Vitamins in Dried Meat

A STUDY of the proximate composition and the thiamin, riboflavin, and niacin content of commercial samples of dehydrated pork and corned-beef hash at the time of production and after definite periods of storage is reported. Some determinations of biotin and folic acid have been included.

Samples of dehydrated pork from current production had a dry-matter content about twice that of fresh pork. Without loss of vitamins in processing, the vitamin content of dehydrated pork should have been two to three times that of fresh meat. This was true for riboflavin and niacin. There was a loss of about 50 percent thiamin during dehydration.

For the storage studies, determinations were made on samples of dehydrated pork and corned-beef hash stored at 0, 40, 70, 100, and 120 deg. F., respectively, at intervals of one week, 30 days, 10, 20, and 42 weeks. The results showed that considerable quantities of thiamin may be lost during storage, particularly at the higher temperatures. There was no appreciable loss of riboflavin and niacin in any of the samples at any of the temperatures. Figures for biotin and folic acid are meager, but indicate that biotin is comparable in stability with riboflavin and niacin, whereas folic acid was not. Loss of the latter was noticeable after one week at 100 and 120 deg. F., and almost complete after 10 weeks' storage.

Digest from "Vitamin Content of Dehydrated Meats," by R. A. Whitmore, A. E. Pollard, H. R. Kraybill, and C. A. Elvehjem, *Food Research*, vol. 11, 419-424, September-October, 1946.

Index to Abstracts

SUGAR
Sweetness of Invert Sugar 187

FRUITS
Sweetening from Fruit 187

VITAMINS
Vitamins in Dried Meat 187

DEHYDRATION
Drying Vegetable Blocks 187

CEREAL PRODUCTS
Effect of Drying Upon Properties of Wheat 188
Parboiling Rice 188

BAKING
Soy Flours in Baking 192

MICROBIOLOGY
Lactic Acid Bacteria in Brined Cucumbers 194

FISH
Frozen Shrimp 196
Rancidity in Fish 196

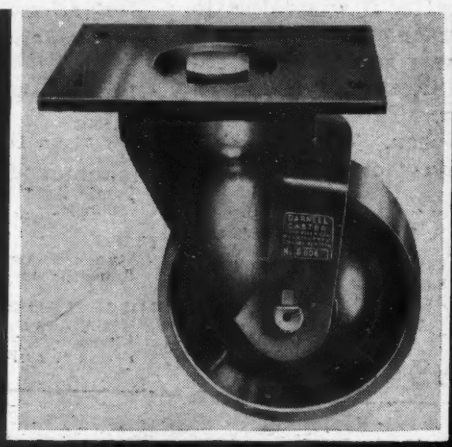
MISCELLANEOUS
Mixing Beverages 198
Fluorine in Food 198
Cream Substitutes 200

DEHYDRATION

Drying Vegetable Blocks

EXPERIMENTAL comparison has been made between vacuum-oven drying and radio-frequency heating in vacuum for further dehydration of compressed blocks of partly dried potatoes and carrots. The conclusion was reached that the r-f vacuum method is faster than the vacuum-oven method for drying potato blocks from 15 to 7 percent, but the quality is lower and offsets any advantage in speed. The r-f vacuum method at 140 deg. F. was equivalent, in both speed of drying and quality of product, to the vacuum-oven method at 158 deg. F. With carrots the r-f vacuum method was superior to the vacuum-oven method, at least as far as rate of drying was concerned, the advantage being greatest in the first few hours of drying. Superiority in rate of the r-f vacuum method over the vacuum-oven method was

An EXTRA MEASURE of QUALITY



DARNELL
CASTERS & WHEELS

If you want maximum floor protection, economy and efficiency Demand Darnell Dependability...Made to give an extra long life of satisfactory service .....

DARNELL CORP LTD
LONG BEACH 4 CALIFORNIA
60 WALKER ST NEW YORK 13 N Y
36 N CLINTON CHICAGO 6 ILL

greater for carrots than for potatoes. Effect of particle size on the drying rate of carrots was investigated by both methods. Blocks were made of unground ⅜-in. carrot cubes, 10- to 25-mesh, and less than 25-mesh particles. The tests showed that reduction of particle size permits increases in drying rate; and again the drying rate for the r-f vacuum method was several times greater than for the vacuum-oven method with a given particle size.

Digest from "Vacuum Drying of Compressed Vegetable Blocks," by W. C. Dunlap, Jr., *Industrial and Engineering Chemistry*, vol. 38, No. 12, 1250-1253, December, 1946.

CEREAL PRODUCTS

Effect of Drying Upon Properties of Wheat

WHEAT that must be dried may suffer heat damage that will seriously impair its baking quality, as well as make it unfit for seed. As a possible index of the heat damage, the phosphatase activity measured by the method of Booth, using the Folin-Ciocalteu reagent, was chosen.

Below 15 percent moisture the phosphatase method is a fairly sensitive index of heat damage, provided an unheated sample can be used as a control. Above 15 percent baking quality is a better index. Above 20 percent, flour quality is more heat sensitive than germination.

At drying temperatures, which produce only 15 percent inactivation of phosphatase, germination is seriously impaired. The temperature at which 80 percent inactivation occurs is also the temperature at which gluten is damaged so that it can no longer be washed from wheat meal. The beard and germends are equally sensitive to danger of baking quality and phosphatase activity.

Digest from "The Drying of Wheat. *IV.* Phosphatase Activity as an Index of Heat Damage in Cereals," by J. B. Hutchinson and R. G. Booth, *Journal of Chemical Industry*, vol. 65, no. 8, 235-37, August, 1946.

Parboiling Rice

WHEN rice is parboiled, the water-soluble vitamins diffuse from the outer layers into, and enrich the inner layers of the kernel. Controlled experiments have been conducted to determine the effect of parboiling rough rice on the thiamin content of the milled form after removal of about 10 percent bran. Methods including boiling; boiling and steaming; steaming; soaking

(*Continued on page* 192)

Today's housewife wants food with more than pleasing flavor. She wants food packed with vital nutritive elements that give her family health and zest!

When she shops, she keeps a picture of her husband and children clearly in mind. She buys food that is not only good—but good for them!

She has been—and still is being—constantly educated on what enrichment means by numerous food articles she reads in her favorite magazine or newspaper.

Is the quality of your products keeping pace with the demands of the modern housewife? Do they have the nutritive values she is looking for?

These are questions many food manufacturers are asking themselves these days . . . *and answering with fortification.* More and more cereals, candies, baby foods and other food products are being fortified.

If there are no definitions and standards for enrichment of the products you make, you may *fortify* without hesitation.

Standard Brands' experience in the food fortification field—and its products for vitamin B-complex, vitamin D and protein supplementation of foods—place this company in a position to render valuable assistance to you.

If you are now seeking ways to fortify your company's products, we invite you to discuss your needs in confidence with one of our executives. Write to the address below.

Products containing

VITAMIN D

Fleischmann's Hy-Dee Irradiated Dry Yeast

Fleischmann's Irradiated Dry Yeast Type 700-H

Standard Brands Viosterol (Activated Ergosterol) Steenbock Process

Products containing

NATURAL B-COMPLEX FACTORS

Fleischmann's Pure Dry Primary Yeasts *(Brewer's Strain)*

Fleischmann's Bee-Flex Products

Fleischmann's Brewer's Yeast Extract Types 3 and 41

Fleischmann's Yeast Extract and Liver

STANDARD BRANDS INCORPORATED

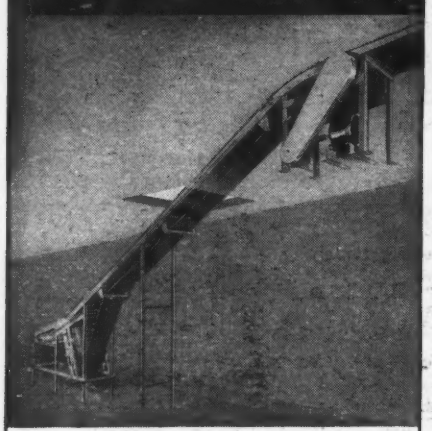
Strong Cobb Division

Bulk Pharmaceutical Department • 595 Madison Avenue • New York 22, N. Y.

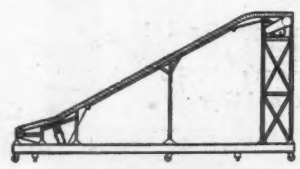
Speed THE HANDLING OF MATERIALS from FLOOR-TO-FLOOR with this

STREAMLINER

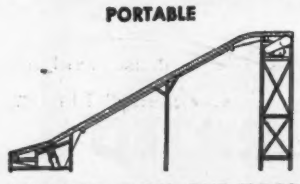
30° INCLINED BELT CONVEYOR



Reversible—this "Streamliner" Belt Conveyor operates either up or down at constant speed of 45 feet per minute. Its rollers can be "SET HIGH," for oversize packages, or "SET LOW" to provide a protective guard rail on both sides of the durable rough top rubber belt. Unit is available in standard sizes up to 30" wide . . . has manual take-up for belt slack . . . may be equipped with casters for portability . . . or can be supported from one floor. Write for full information.



PORTABLE



SUPPORTED FROM ONE FLOOR

HARRY J. FERGUSON CO.

WHEEL • PORTABLE BELT • BELT AND ROLLER GRAVITY CONVEYORS

123 WEST AVE., JENKINTOWN, PENNA.

and steaming; soaking, boiling and steaming. Percent breakage was also determined on all samples. Untreated control samples had an average thiamin content of 0.60 μg/g., and the average breakage on shelling was 3.8 percent.

Best results were obtained by the following procedures, with their respective thiamin content and percent breakage: Boiling for 20 min., followed by 15 min. steaming at 5 lb. pressure, 2.13 μg/g. and 4 percent; 15 hr. soaking at 80 deg. F., followed by 25 min. steaming at 15 lb. pressure, 2.71 μg/g. and 6.1 percent; 45 hr. soaking at 80 deg. F., or a minimum of 6 hr. soaking at 95 deg. F., followed by 10 min. steaming at 15 lb. pressure, 2.20 μg/g. and 3.1 percent; 6 hr. soaking at 104 deg. F., followed by 15 min. steaming at 15 lb. pressure, 2.20 μg/g. and 0.9 percent; after minima of 4 hr. soaking at 140 deg. F., 2 hr. at 158 deg. F., 2 hr. at 176 deg. F., 30 min. at 194 deg. F., all followed by 10 min. steaming at 15 lb. pressure, average 2.30 μg/g. and 4.2 percent. Other results also are tabulated on a total of 88 samples of rice treated under a variety of conditions.

Digest from "Effect of Parboiling on Thiamine in Rice," by M. C. Kik, *Cereal Chemistry*, vol. 23, No. 6, 529-539, November, 1946.

BAKING

Soy Flours in Baking

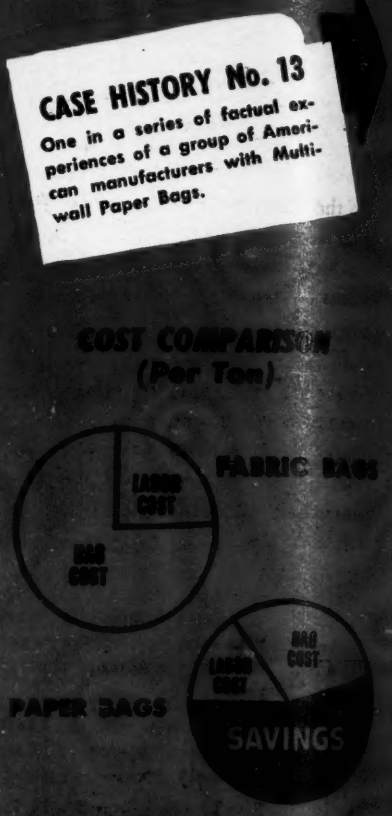
LACK of uniformity in chemical composition and physical properties of soy flours gives rise to numerous problems when such flours are used in appreciable amounts in baking. Soy flours are usually classified according to fat content: minimum-fat (one percent or less), low-fat (4 to 8 percent), and high-fat (18 to 24 percent). Other constituents affecting baking quality vary with fat content. Variable physical properties include weight per unit volume, water absorption, size of particle, color, flavor, and keeping quality.

Examination of 18 samples of soy flour from different parts of the United States revealed a tendency for moisture content, weight per unit volume, and water-absorption capacity to decrease as the fat content increases. Size of particle tends to increase with increase in fat content, and high-fat flours are somewhat darker in color than those of the other two classes.

Using the same 18 samples of soy flour, baking experiments were made to determine the palatability

CASE HISTORY No. 13

One in a series of factual experiences of a group of American manufacturers with Multiwall Paper Bags.



ST. REGIS PACKAGING SYSTEMS are designed to meet a wide range of product requirements and plant layouts. Packers are available in a variety of sizes and types, with filling speeds as high as twenty-four 100-lb. bags per minute—with one operator. Nearly 400 commodities—rock products, fertilizers, chemicals, foods, and feeds—are now being packaged in sturdy, low-cost multiwall paper bags.

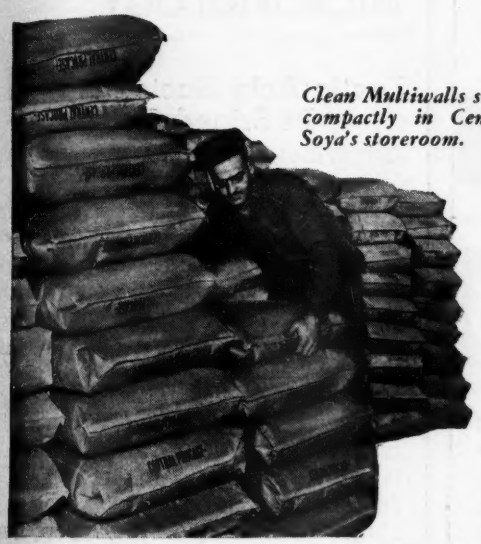
Accent on Sanitation PAYS DOUBLE DIVIDENDS

To the Central Soya Company, Inc., a sanitary package is a vital factor in the sale of its soya flour—one of the many soybean products made in one of the company's three Mid-Western plants.

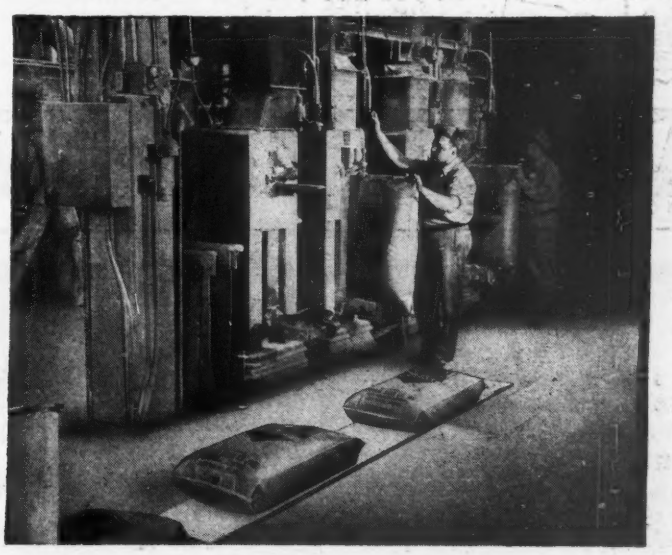
This company, whose executive offices are in Fort Wayne, Indiana, formerly packed its flour in fabric bags. Recently it adopted a St. Regis Packaging System consisting of four 100-LS bag-filling machines and multiwall paper valve bags. Clean, fresh-looking Multiwalls won immediate approval from customers. They commented that these dust-free containers assured more effective protection against contamination and infestation. Untouched by human hands, Central Soya's flour today enjoys an enviable reputation for cleanliness.

In addition to better sanitary protection, the new system paid an extra dividend in the form of important economies in containers, labor costs, and in unit packaging costs, as shown graphically on the page at the left.

Thus, the company achieved two important objectives — more sanitary packaging and a substantial saving in costs. The savings alone, typical of economies provided by St. Regis systems, explain why manufacturers in many industries have adopted this modern packaging method. Mail the coupon for the complete picture story of this efficient, economical operation.



Clean Multiwalls stack compactly in Central Soya's storeroom.



Multiwalls are filled by this battery of four 100-LS packers, then placed on the floor-level conveyor for movement directly to box-cars or storage room.

MULTIWALL

ST. REGIS SALES CORPORATION

(Sales Subsidiary of St. Regis Paper Company)

NEW YORK 17: 230 Park Ave. CHICAGO 1: 230 No. Michigan Ave.
BALTIMORE 2: 1928 O'Sullivan Bldg. SAN FRANCISCO 4: 1 Montgomery St.
ALLENTOWN, PA.: 202 Parr Bldg.

Mail this coupon for the complete story

Atlanta Birmingham Boston Cleveland Dallas Denver
Detroit Franklin, Va. Los Angeles Nazareth, Pa. New Orleans
No. Kansas City, Mo. Ocala, Fla. Oswego, N. Y. Seattle Toledo
IN CANADA: St. Regis Paper Co. (Can.) Ltd., Montreal, Vancouver.

Without obligation, please send me full details regarding "Case History" No. 13, outlined above.

NAME_____

COMPANY_____

ADDRESS_____

You Are Looking at the
ROTARY PUMP
Most Folks Look For!

VIKING

And there's a reason . . . It does the job because it is simple . . . just 2-moving parts—each self supported. It operates at low speed resulting in longer, trouble-free life. There are no gadgets, springs, timing gears etc. to get out of order.

It's self-priming . . . moves the liquid without pulsation. Delivers against discharge pressures of 50-100-200-500 psi depending upon the application and construction.

Write today for folder 100E.

See Our Catalog In SWEETS

VIKING Pump COMPANY
CEDAR FALLS, IOWA

Whatever the Process

- FREEZING
- CANNING
- DEHYDRATING
- PICKLING

Use LA PORTE FLEXIBLE STEEL CONVEYOR BELTING

Features that make La Porte Flexible Steel Conveyor Belting adaptable to all processing and packaging operations are: (1) its strong steel mesh construction that resists loading impacts and prevents stretching, weaving, creeping and jumping; (2) its porous structure that permits circulation of air and liquids around products in process . . . allowing drainage and facilitating cleaning and sterilization; (3) its non-corrosive metal that needs no special dressing and is not affected by steam or extreme temperatures.

Ask your Supplier TODAY for La Porte Conveyor Belting. It is available in any length—almost any width.

LA PORTE MAT & MFG. CO.
BOX 124 LA PORTE, INDIANA

of muffins and plain shortened cakes containing soy flour, and the merits of soy flours of different fat content. One series of muffins contained the same measure of soy flour regardless of weight. A second series contained 26.2 percent soy to total flour. All cakes contained 15 percent by weight of soy to total flour. Index to volume measurements of cakes and muffins in the second series showed little difference in volume with respect to type of soy flour. Differences in quality of the products according to type of soy flour used were not statistically significant, although some degree of preference was shown for high-fat soy flour in muffins and possibly cakes.

Digest from "A Comparative Study of Soy Flours for Use in Baking. I. Composition and Properties of Soy Flours; II. Effect on Quality of Muffins and Cakes," by E. C. Faulkner and J. I. Simpson, *Food Research*, vol. II, 447-459, September-October, 1946.

MICROBIOLOGY

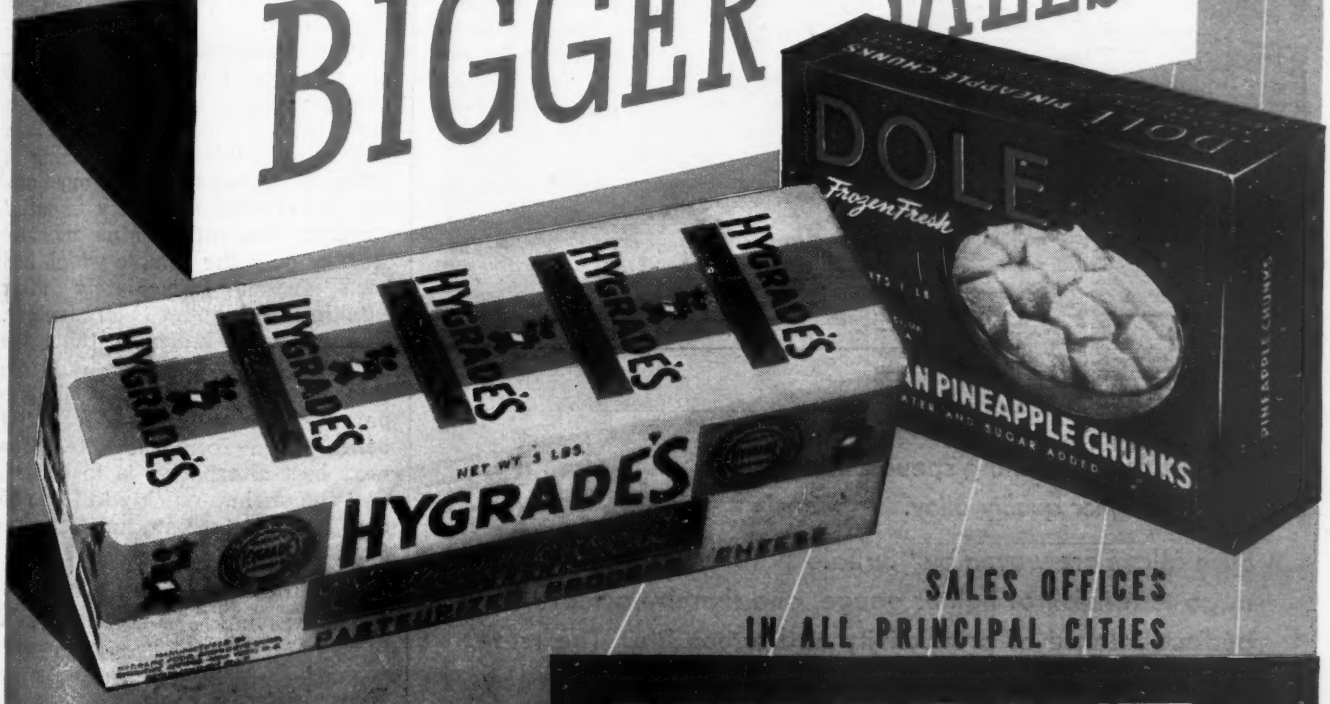
Lactic Acid Bacteria In Brined Cucumbers

INVESTIGATIONS have been conducted at North Carolina pickling plants to determine the nature of the predominating lactic acid bacteria involved during the fermentation of salt-stock cucumbers. Thirty-six isolates were obtained during the 1938 season from the active phase of fermentation of 85-bushel lots of cucumbers brined at 5, 8, and 10.5 percent salt concentration. In addition, 13 random isolates from six 720-bushel lots of fermenting cucumbers at various stages of activity in 10.5 percent brine were also studied. Details of the origin of all cultures are tabulated; and results are summarized for such tests as action on carbon compounds, relation to salt, thermal death temperature, and carbon dioxide production.

Results of the investigation indicate that *Lactobacillus plantarum* was chiefly responsible for the brine acidity of the fermented cucumbers, and that other types of lactic acid bacteria, such as species of *Leuconostoc* or the gas-producing species of *Lactobacillus*, did not contribute materially to acid formation. Salt concentrations of 5 to 10 percent apparently inhibit the activity of gas-producing lactobacilli. Neither brine temperatures nor brine acidity, on the other hand, can be regarded as important factors in the inactivity of the gas-producing species. Failure to obtain

PACKAGES BY MILPRINT

your insurance for BIGGER SALES



SALES OFFICES
IN ALL PRINCIPAL CITIES

Consistent consumer recognition of your product — thru eye-appealing packages — is real assurance — and certain insurance for bigger sales.

MILPRINT Inc.

PACKAGING CONVERTERS • PRINTERS • LITHOGRAPHERS

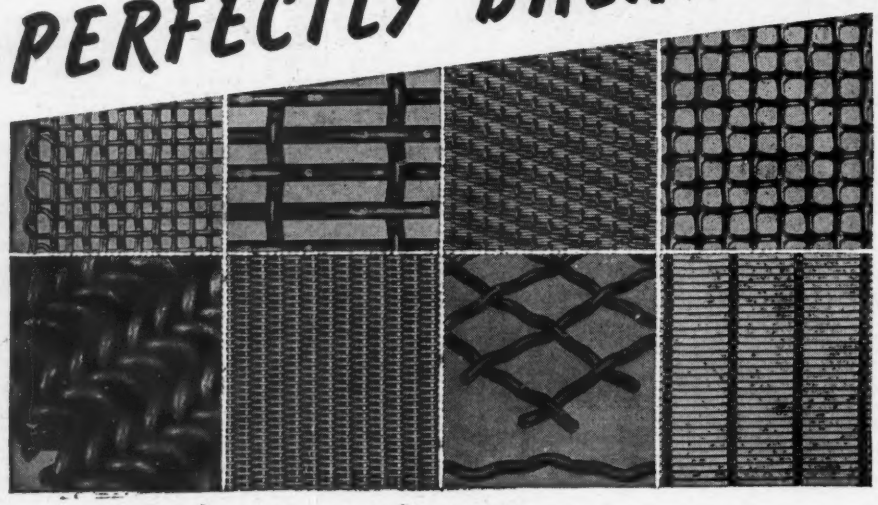
plants at | Milwaukee, Philadelphia, Los Angeles, San Francisco, Tucson, Vancouver, Washington

Mill at De Pere, Wisconsin

PACKAGING HEADQUARTERS TO AMERICAN INDUSTRY

WIRE CLOTH COST AND SEPARATING SPEED

PERFECTLY BALANCED



To increase separating speed and lengthen your screen life, select a *higher quality alloy.*

Such alloys are woven by "Buffalo Wire." They permit you to go to a mesh of lighter gauge, and thereby achieve the perfect balance of productivity and screen life. The relatively higher cost of a durable alloy is more than offset by greater separating speed and less frequent wire cloth replacements.

NEW FOLDER 596

Tells how "Buffalo" Stainless Steel Wire Cloth cuts costs and improves performance in thousands of installations. Valuable data on corrosion-resistance. Write for your copy.

MANUFACTURER OF ALL KINDS OF WIRE CLOTH SINCE 1869

Buffalo WIRE WORKS CO., INC.

452 TERRACE BUFFALO 2, N. Y.

isolates of the *Leuconostoc* genus is probably due to the fact that they do not develop rapidly at brine temperatures of 86 deg. F., and that they do not have as high salt tolerance as *L. plantarum.*

Digest from "Characteristics of Lactic Acid Bacteria from Commercial Cucumber Fermentations," by J. H. Etchells and I. D. Jones, *Journal of Bacteriology,* vol. 52, 593-599, November, 1946.

FISH

Frozen Shrimp

CONDITIONS affecting the quality of frozen shrimp have been studied in a floating test laboratory accompanying trawlers in the Gulf of Mexico. The principal obstacle to better preservation is the lack of facilities on trawlers to keep the catch cool before delivery to shore plants or to ice boats. The sooner icing is done after the shrimp are taken from the sea, the better the quality. Another need of the industry is mechanical means of removing heads, shells and "vein" of the shrimp.

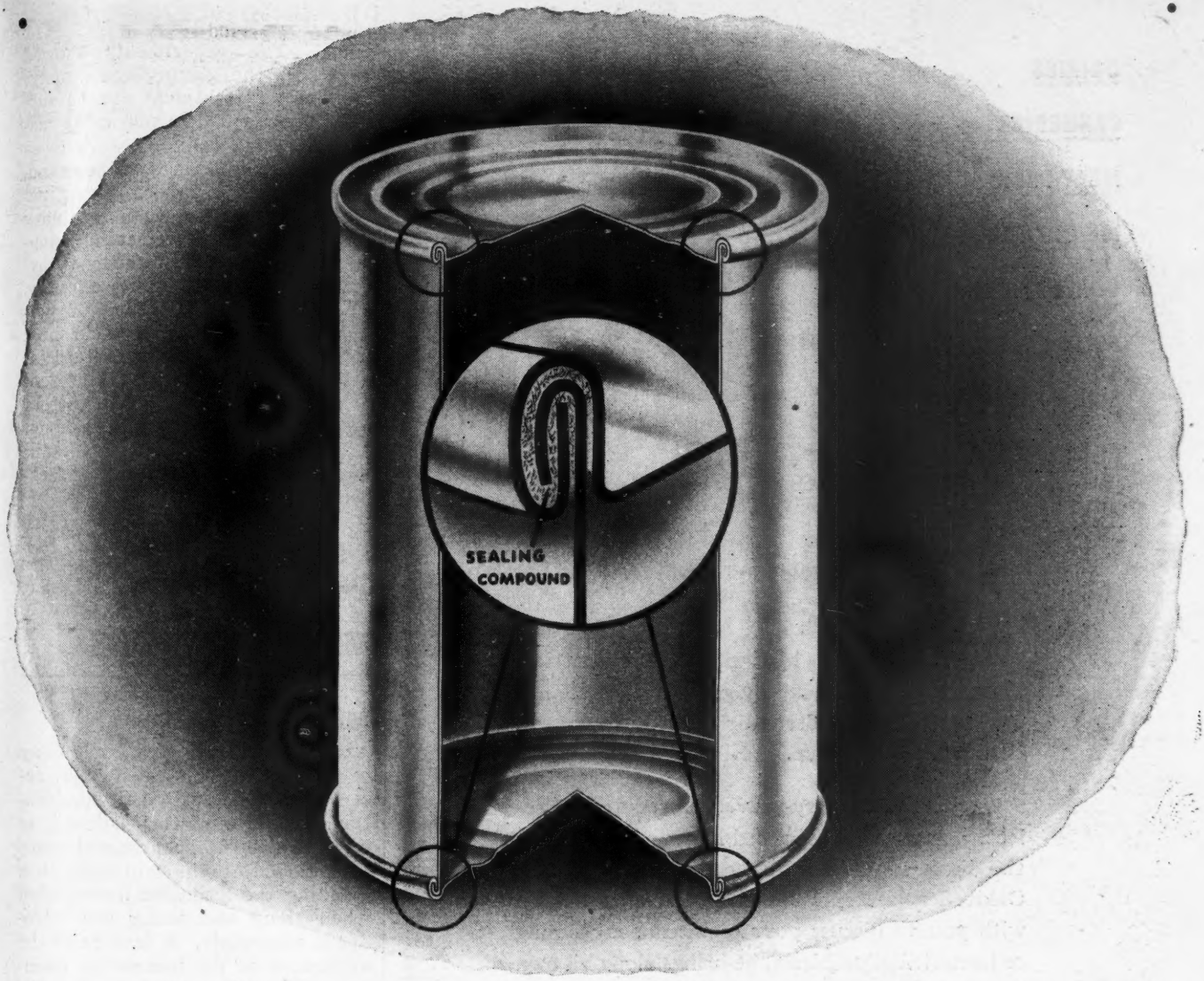
Tests made on the effect of holding whole and headed shrimp for varying periods of time at the high temperature of 38 deg. F., and then packaging, freezing and storing at 0 deg. F., showed satisfactory quality and flavor after six months' storage. But after nine months' storage only the sample which had been frozen immediately after catching was judged satisfactory. The results indicate that the highest quality shrimp are obtained only when the catch is prepared and frozen immediately after being taken from the nets. The next best alternative is to behead, cool the shrimp quickly to 32 to 35 deg. F. and store at that temperature.

Digest from "Conditions Affecting Quality of Frozen Shrimp," by E. A. Fieger and C. W. DuBois, *Refrigerating Engineering,* September 1946.

Rancidity in Fish

DEALING with the value of ice "glazes" and of immersion in ascorbic acid solutions in retarding the development of rancidity in frozen fish, this report relates to a series of experiments on that subject. Other reports have dealt with different cold storage temperatures and of storage in nitrogen or carbon dioxide gas.

Unglazed, glazed, and dipped salmon steaks and fillets were individually wrapped and stored at temperatures below freezing, and subsequently tested for their perox-



About 3/1000 of a cent's worth of very important material

That's the cost of the little film of lining compound inside the seam on each end of a can.

You've probably never realized it's there, because it's sealed *inside* a double interlocking seam—performing the very important function of closing the last possible microscopic opening.

Many years of scientific research have gone into that lining compound.

It *has* to be good! It may have to withstand acid, alkali, alcohol, fat, oil, water, steam, heat, cold, air, pressure, and the aging process.

Of course, no *one* compound can serve all uses. The Central Research Laboratories of American Can Company have perfected many lining compounds in more than 35 years of research.

Not infrequently we have to make experimental packs of a new product to prove the effect of product and lining compound on one another.

Almost all compounds used to be based on latex rubber—but the war forced us into intensified synthetic rubber research—and we finally came up with some synthetics which proved superior to pre-war compounds.

Lining compounds are just one of the many research projects which we undertake. Why? Because it's our business to demonstrate daily that...

NO OTHER CONTAINER PROTECTS LIKE THE CAN

American Can Company

CANCO

NEW YORK • CHICAGO • SAN FRANCISCO

DAIRIES
CANNERIES
MEAT PACKING
ICE CREAMERIES
CONFECTIONERIES
FOOD FREEZING
FISH PACKING
BREWERIES
BAKERIES

tested Oakite techniques

...and in-plant Oakite Service help improve Cleaning & Sanitation

WITH fixed costs high and cleaning materials short, now is a particularly good time to talk improved cleaning and sanitizing with your local Oakite Representative.

Oakite industry-proved procedures are selected, applied and serviced in your plant under the direct supervision of a conveniently located Oakite Service Representative. When he sits down with you to discuss your maintenance-cleaning or bactericidal problems, he brings along his own broad experience . . . *plus* that of the 159 other Oakite Representatives serving the food industries . . . *plus* the knowledge of a wide-awake headquarters research staff . . . *plus* Oakite's 39-year background in scientific cleaning for industry.

Whatever helpful ideas the Oakite Representative may contribute toward saving time and money are offered as part of Oakite's wide in-plant service. There is no cost . . . no obligation. When you arrange for a chat with him, ask him to bring along a free copy of the famous "97" Oakite Digest.

OAKITE PRODUCTS, INC., 26G Thames St., NEW YORK 6, N. Y.
Technical Service Representatives in Principal Cities of U. S. & Canada

OAKITE
REG. U. S. PAT. OFF.

Specialized Industrial Cleaning
MATERIALS • METHODS • SERVICE

ide value after different periods of time. The experiments showed that both the glazing and dipping methods of treatment can be successfully applied when using ascorbic acid or sodium ascorbate as an antioxidant. On the other hand, glazes of ethyl gallate were practically no better than ordinary water glazes in preventing development of rancidity, although ethyl gallate dips were quite effective. The tests indicated that 0.04 percent or more of ascorbic acid must be present in fish flesh to retard fat oxidation, and that at the present price of ascorbic acid the cost of dipping treatment might be about ¾c. per lb. of fish. Complete details are tabulated for four sets of experiments.

Digest from "Control of Rancidity in Stored Fish, III," by H. L. A. Tarr, *Progress Reports of the Pacific Coast Stations*, No. 68, September, 1946, Fisheries Research Board of Canada, Vancouver, B. C.

MISCELLANEOUS

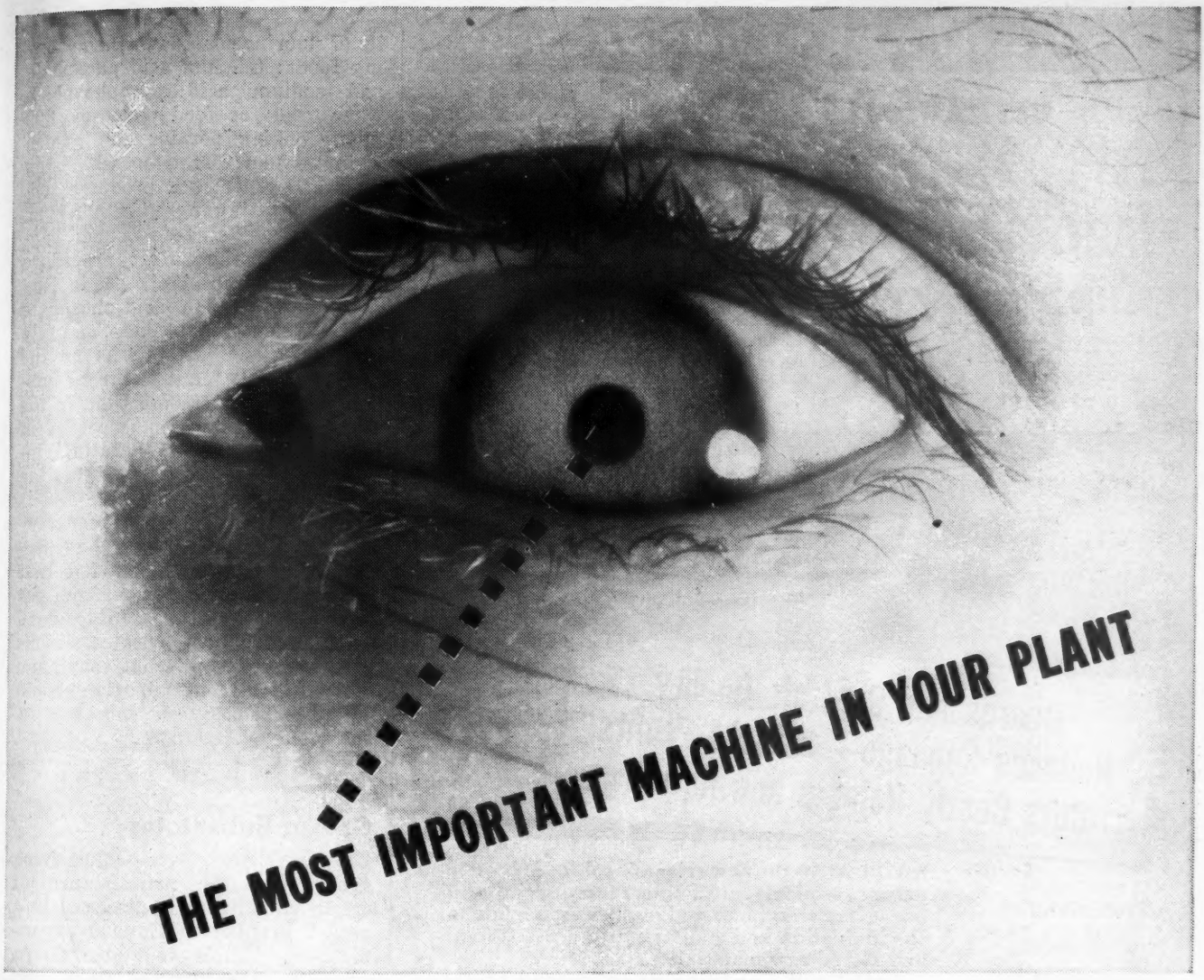
Mixing Beverages

APPARATUS for mixing and filling beverages is illustrated and described in a recent patent specification. The crux of the method is to mix the sirup and carbonated water prior to filling the container, thus avoiding the agitation necessitated when sirup and water are introduced separately. A feature of the apparatus is the means for maintaining proper proportions of the constituent liquids. Various controls and speed-change arrangements insure that as long as the apparatus is operating, a mixture of proper proportions will be produced, and that if conditions become such that a proper mixture cannot be produced, operation will terminate immediately. A positively acting mixing device insures that the sirup will be uniformly dispersed throughout the carbonated water.

Digest from U. S. Patent 2,408,107, issued September 24, 1946, on an application dated February 14, 1940, to R. J. Stewart, Baltimore, Md., and assigned to Crown Cork & Seal Co., Inc., Baltimore, Md.

Fluorine in Food

SUPPORTED by medical opinion based on animal experiments that fluorine is ingested from rock phosphates, causing bone lesions, pathological changes in the mucous membrane of the alimentary canal, and nephrosis, the Inter-Departmental Committee on Food Standards, Ministry of Foods, England, proposes to issue an order prescribing the lim-



No MATTER what you manufacture, there's one machine in your plant more important than any other . .

THE HUMAN SEEING MACHINE!

For fast, efficient production your workers must see quickly, easily and *accurately*. And to operate in comfort these "human seeing machines" need ample light of high quality, free of glare and shadows and evenly distributed throughout the work area.

But lighting fixtures alone are not enough. Your local Lighting Engineer will tell you that. For maximum efficiency they must be backed up by ceilings and walls finished with a paint of highest possible reflectivity. For light and paint are PARTNERS in the creation of good seeing conditions.

Alert maintenance and operating men know this means WHITE paint, for white reflects far more light than any other color. They know, too, that if painting is to be a sound investment, the white they buy must be easy to apply on large areas, give good "yardage" without loss of hiding power and remain white for the longest possible time.

That's why for years so many of America's better plants have standardized on "Barreled Sunlight."

U. S. GUTTA PERCHA PAINT COMPANY
37C Dudley Street, Providence 1, R. I.

I'd like to know more about the partnership of Light and Paint. Please send me your free booklet, "Light and Color in the Work-World."

COMPANY .....

STREET AND NUMBER .....

CITY ..... ZONE ..... STATE .....

MY NAME IS .....

MY TITLE .....

© 1947 U. S. Gutta Percha Paint Company

NEW! SCIENTIFIC GERMICIDAL UNIT

ULTRAVIOLET

Rad-i-Air

PROTECTS THE PURITY OF YOUR PRODUCTS

Guards and Controls Quality
Reduces Spoilage—Protects Profits
Cuts Costly Rejects and Returns

Protection for Processing Operations in these Industries:

MEAT PACKING
POULTRY
DAIRY
BAKING
CANDY-SUGAR
CANNING
BEVERAGES
FATS AND OILS
CEREALS-GRAINS

RAD-I-AIR—the new scientific source of high intensity germicidal ultraviolet radiation, kills airborne bacteria, fungi and molds responsible for contamination and spoilage of processed foods and stored raw materials.

RAD-I-AIR Conditioning offers food processors a practical, low-cost method for protecting product purity and control of quality. Installed in all processing rooms for general air disinfection and in coolers and storage areas, over vats, machinery and conveyor lines, RAD-I-AIR creates areas of sanitized air in which food materials can be handled and processed without the dangers of bacterial attack. Such protection guards purity, cuts costly spoilage, lowers the percentage of returned goods, lengthens storage and shelf life, improves appearance, helps retention of flavor.

RAD-I-AIR is a powerful, economical bacterial control for a large variety of processing operations in many basic food industries where reputation and profits depend upon product quality and efficient production. A RAD-I-AIR installation pays for itself in the unusual protective advantages it offers—advantages that result in improved internal operations and in greater customer acceptance.

WRITE FOR Rad-i-Air DETAILS

TRU-AIR ULTRAVIOLET PRODUCTS CO., Dept. 8-B-7
1019 N. Madison Avenue, Los Angeles 27, California

Send full information concerning the application of RAD-I-AIR to food processing operations.

Firm.....

Name.....

Address.....

its of fluorine content in the following foods: Calcium acid phosphate and sodium acid pyrophosphate when used for food purposes, 300 ppm.; baking powder and golden rising powder, 100 ppm.; self-rising flour and other food products containing aerating ingredients, 8 ppm. The Medical Research Council suggested that the safest procedure would be to prohibit the use in food products of calcium acid phosphate made from rock phosphate, and rely on elementary phosphorus as the raw material. Manufacturers submitted a report stating that, in the combination in which it occurs in food products after aerating ingredients have interacted, fluorine is insoluble in gastric juice and is excreted. In the face of contrary medical opinion, however, the Inter-Departmental Committee felt that the risk to public health from the repeated ingestion of small amounts of fluorine was too serious to be ignored and that maximum limits for the contamination should be prescribed.

Digest from "Fluorine and Foodstuffs," *Chemical Trade Journal and Chemical Engineer*, 160, 162, 170, August 9, 1946.

Cream Substitutes

DISCOVERY of new emulsifying agents for the manufacture of cream substitutes is disclosed in a patent granted to English experimenters. Edible vegetable flours, such as those derived from soya beans, rye and oats, form the base of the emulsifier. It is prepared in the form of an aqueous serum containing the flour, a stabilizing agent in the form of a phosphate or citrate, common salt, and a gum to minimize the tendency of the cream, when beaten, to exude liquid serum on standing. Hardened or unhardened vegetable or animal oils or fats comprise the other principal constitutent of the cream substitute. This fat base at a temperature of 113 deg. F. and pressure of 180 to 200 kg. per sq. cm. is injected into the emulsifying serum through nozzles having an orifice diameter of 0.5 mm. The intimate mixture thus produced is pasteurized at 200 deg. F., cooled to 167 deg. F., twice homogenized and ultimately cooled to 50 deg. F. Coloring and flavoring constituents are added at appropriate points in the process; and the pH is adjusted to approximately 7. Vitamins also may be added. The product is a whippable cream substitute.

Digest from of U. S. Patent 2,407,027, issued September 3, 1946, on an application dated January 5, 1943, to R. D. Mason, Richmond, and A. C. Justesen, Heston, England.

BOOKS

Ice Cream Production

THE ICE CREAM INDUSTRY, Second Edition. By Grover Dean Turnbow, Paul Hubert Tracy and Lloyd Andrew Raffetto. Published by John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y., 1947. 6x9¼ in.; 654 pages; cloth. Price, $6.

Here is a revised edition of an excellent treatise on ice cream manufacture, first published in 1928. The developments since the book's first appearance have been incorporated in this volume, through both revision and addition.

Two of the new chapters deal with sanitation of ice cream plants and of dairy plant equipment. Flavoring, specialties, and defects in ice cream and its manufacture are discussed in detail. Directions for the more common chemical and bacteriological tests performed in an ice cream plant are also included. The section on engineering has been expanded to include such subjects as new types of refrigerants, illumination and conveyor systems.

To complete the treatment, there is also a section on plant costs, record keeping and merchandising.

Labor Law

INDUSTRIAL PEACE AND THE WAGNER ACT. By Thedore R. Iserman. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y., 1947. 5½x8 in.; 91 pages; paper. Price, $1.50.

No single development of the Roosevelt years has had greater repercussions than the industrial labor relations induced by the Wagner Act, passed July 5, 1935. This monograph recounts in detail the provisions of the Act that have brought about its impact on our present day economy. The job is a complete one and includes the background situations leading to the Act as well as a chapter on what should be done about it.

Food Accentuators

SYNTHETIC FOOD ADJUNCTS. By Morris B. Jacobs. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y., 1947. 6¼x9¼ in.; 335 pages; cloth. Price, $5.50.

The rapid advance in the use of synthetic adjuncts in foods, within recent years, has made a book on the subject as welcome as it is needed. This book covers such substances as synthetic food colors, flavors, essences, sweeteners, preservatives, stabilizers and vitamins.

The result is not intended to be a formulary even though many color and flavor compositions are detailed. These formulations, however, should serve the informed reader as operating suggestions, while others may find them useful as a basis for instruction.

Nutrition Studies

VITAMINS AND HORMONES, Vol. IV. Edited by Robert S. Harris and Kenneth V. Thimann. Published by Academic Press, Inc., 125 E. 23rd St., New York, N. Y., 1947. 6¼x9¼ in.; 403 pages; cloth. Price, $6.80.

This latest volume follows the lead of its predecessors in presenting the most significant research literature in these two interrelated fields. The food chemist, digging below the processing surface, will find particular interest in the nutritional aspects of these reports.

Catalog

MCGRAW-HILL BOOKS, 1947 CATALOG. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. 5¾x8½ in.; 326 pages; paper. Free.

This new catalog has several innovations, the most notable of which is the listing of the date of original issue, or latest revision for each book. All the current McGraw-Hill technical books are there, as are the Whittlesey House publications, designed for general reading.

GOVERNMENT PUBLICATIONS

The following recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated the pamphlet is free and should be ordered from the bureau responsible for its issue.

BUREAU CHIEF REPORTS. Annual reports of the chiefs of various bureaus, departments, and other agencies were submitted to Congress early in the calendar year covering the fiscal year closing June 30, 1946. Those interested in individual items of this character should address requests to the individual bureau or agency of interest.

PLANT CONFERENCES CONDUCTED ON

Controlled

INDUSTRIAL SANITATION

COURSES

- SURVEYS
- RATINGS
- MANAGEMENT
- EMPLOYEE PARTICIPATION
- METHODS AND TRAINING
- ARCHITECTURE AND ENGINEERING
- PRODUCTS
- EQUIPMENT

One to Five Day Programs Presented in Your Plant for

MANAGEMENT
SANITATION SUPERVISORS
SANITATION STAFF

Brochure Available on Request

INDUSTRIAL SANITATION COUNSELORS

2934 Cleveland Blvd.
Louisville, Ky.

SPEEDWAYS

The SHORTEST, FASTEST CHEAPEST DISTANCE BETWEEN TWO POINTS!

Low-cost SPEEDWAYS move cartons, cases and crates—boxes and cartons in less time, with less manpower, at less cost.

Solve Your MATERIAL HANDLING PROBLEMS With SPEEDWAYS CONVEYORS

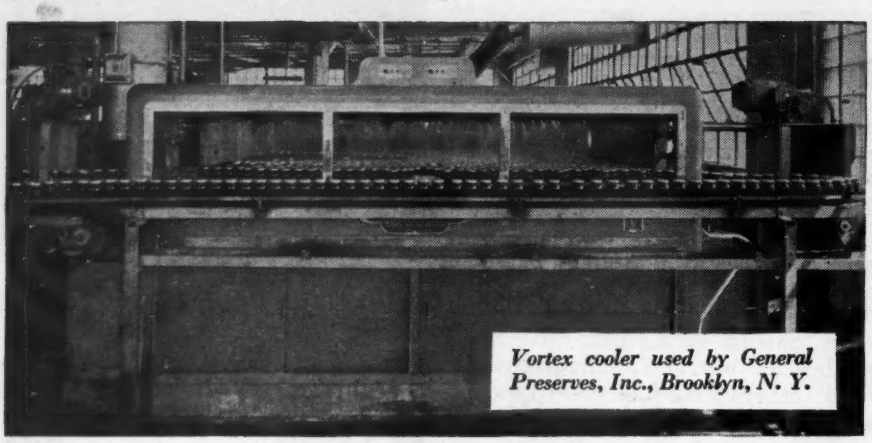
SPEEDWAYS standard model—15" wide overall with 10 wheels per foot—can handle 90% of your cartons, cases, boxes, packages, etc.

Write for FREE 2-color illustrated folder.

KEEP 'EM ROLLING WITH SPEEDWAYS CONVEYORS, INC.

1263 Niagara St., Buffalo 13, N. Y.

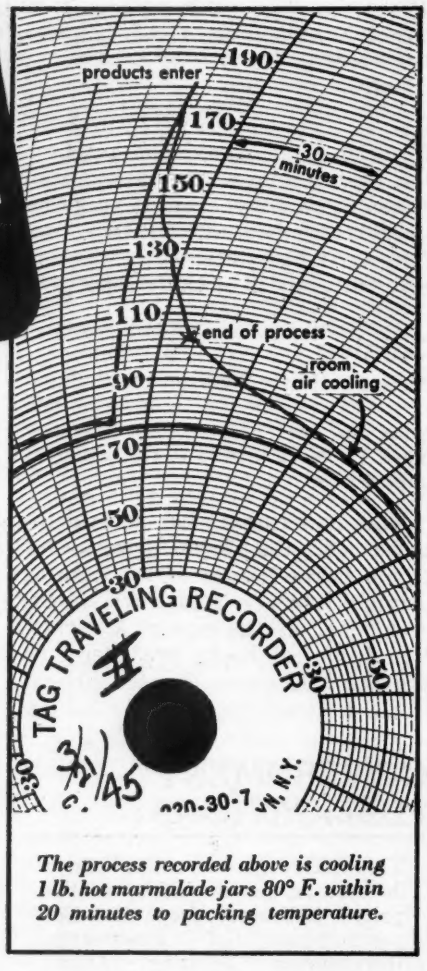
Represented by experienced Material Handling equipment Engineers in principal cities.



Vortex cooler used by General Preserves, Inc., Brooklyn, N. Y.

Your Hot Packaged Foods Deserve

VORTEX Automatic Cooling



The process recorded above is cooling 1 lb. hot marmalade jars 80° F. within 20 minutes to packing temperature.

Automatic cooling of your products deserves scientific treatment to preserve the original flavors and clarity by *positive* control of time and temperature.

The Vortex system is entirely automatic in operation and can be run continuously without operators, requiring only routine maintenance. The heat exchange medium is atomized water, distributed over the containers in such a manner that maximum cooling is achieved with a minimum quantity of water.

Vortex coolers are widely adaptable to individual requirements and have an almost limitless capacity range for all sizes of jars, bottles or cans. The use of these machines greatly conserves floor space and allows for immediate labeling and packing. A rapid drying system can be supplied with the discharge conveyors, if desired.

Whatever your problem of cooling—or heating—your products, it will pay you to learn the Vortex method of achieving uniform results economically. Send us your process requirements and write for bulletin No. 87 today.

BARRY-WEHMILLER MACHINERY CO.

1946 . . . Our 61st Anniversary St. Louis, Mo., U.S.A.

FLUID MILK CANS. Simplified Practice Recommendation R208-46. National Bureau of Standards. Price 5 cents.

THE PRODUCTION OF ITACONIC ACID FROM THE CRUDE ACONITATE OBTAINED FROM SUGARCANE MOLASSES. By J. A. Ambler, et al. Bureau of Agricultural and Industrial Chemistry, AIC-132. Mimeographed.

DIRECTORY OF THE BUREAU OF ANIMAL INDUSTRY. Revised to July 1, 1946. Department of Agriculture. Price 10 cents.

LIST OF PUBLICATIONS OF THE U. S. DEPARTMENT OF AGRICULTURE FROM JANUARY 1941 TO DECEMBER 1945, INCLUSIVE. Department of Agriculture Miscellaneous Publication No. 611.

ESTIMATION OF THE COMPOSITION OF BEEF CARCASSES AND CUTS. By O. G. Hankins and Paul E. Howe. Department of Agriculture, Technical Bulletin No. 926. Price 10 cents.

STANDARDIZATION AND INSPECTION OF FRESH FRUITS AND VEGETABLES. By Raymond L. Spangler. Department of Agriculture, Miscellaneous Publication No. 604. Price 10 cents.

POULTRY DISEASE INVESTIGATIONS AT THE U. S. REGIONAL POULTRY RESEARCH LABORATORY. Department of Agriculture, Miscellaneous Publication No. 609M. Price 10 cents.

EFFECT OF PARBOILING AND RELATED TREATMENTS ON THE MILLING, NUTRITIONAL, AND COOKING QUALITY OF RICE. By Jenkin W. Jones, et al. Department of Agriculture, Circular No. 752. Price 5 cents.

DETERMINATION OF WATER QUALITY. By M. M. Ellis, et al. Fish and Wildlife Service, Research Report 9. Price 25 cents.

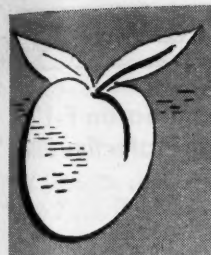
AGRICULTURAL STATISTICS 1945. Department of Agriculture. Price $1.00.

RESEARCH ON PEANUTS AND PEANUT PRODUCTS AT THE SOUTHERN REGIONAL RESEARCH LABORATORY. By K. S. Markley. Bureau of Agricultural and Industrial Chemistry, AIC-109. Mimeographed.

GLUTAMIC ACID REVIEW AND BIBLIOGRAPHY. By H. S. Olcott and G. H. Brother. Bureau of Agricultural and Industrial Chemistry, AIC-119. Mimeographed.

THE USE OF DDT FOR ROACH CONTROL. By L. S. Henderson. Bureau of Entomology and Plant Quarantine, E-701, Mimeographed.

REDUCTION OF LOSS AND DAMAGE IN RAIL TRANSPORTATION OF FRESH FRUITS AND VEGETABLES BY IMPROVED LOADING METHODS. By Philip L. Breakiron. Department of Agriculture, Bureau of Agricultural Statistics. Mimeographed.



For the Frozen-Food and Fruit-Juice Packer

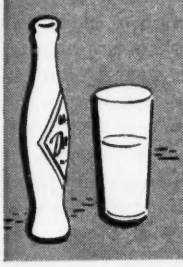
ASCORBIC ACID MERCK
(Vitamin C)

For retarding oxidation and for flavor retention in peaches, apricots, and apple juice; also for its nutritional advantages in these products.

For the Milling, Baking, Cereal, and Macaroni Industries

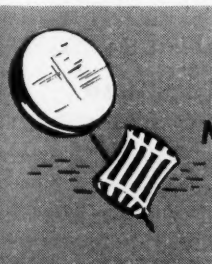
- Merck Enrichment Ingredients
- Merck Vitamin Mixtures for Flour Enrichment
- Merck Bread-Enrichment Wafers
- Merck Vitamin Mixtures for Corn Products Enrichment
- Merck Vitamin Mixtures and Wafers for Macaroni Enrichment

Merck Bread-Enrichment Wafers are distributed by yeast companies.



For the Soft-Drink Industry

Caffeine Merck · Citric Acid Merck
Lactic Acid Merck
Lithium Chloride Merck
Lithium Citrate Merck
Phosphoric Acid Merck
Sodium Benzoate Merck
Sodium Citrate Merck
Tartaric Acid Merck



For the Manufacturing Confectioner

Citric Acid Merck
Cream of Tartar Merck
Methyl Salicylate Merck
Milk Sugar Merck
Tartaric Acid Merck

Merck Pure Vitamins for the Food Industry

VITAMIN B_1
(Thiamine Hydrochloride)
Synthesized in The Merck Research Laboratories, 1936

RIBOFLAVIN (Vitamin B_2)
Made available by Merck & Co., Inc. in 1938

NIACIN (Nicotinic Acid)
Made available by Merck & Co., Inc. in 1938

ASCORBIC ACID (Vitamin C)
Made available by Merck & Co., Inc. in 1934

MERCK PRODUCTS

For Food Enrichment • Food Fortification and Food Processing

MERCK MERCK MERCK

Symbol of Leadership and Quality

Merck products are well known to forward-looking food processors the country over. Each product in the Merck line gives complete satisfaction . . . satisfaction founded on noteworthy performance the year round. When you use Merck products you may be sure that you are buying the best the market affords.

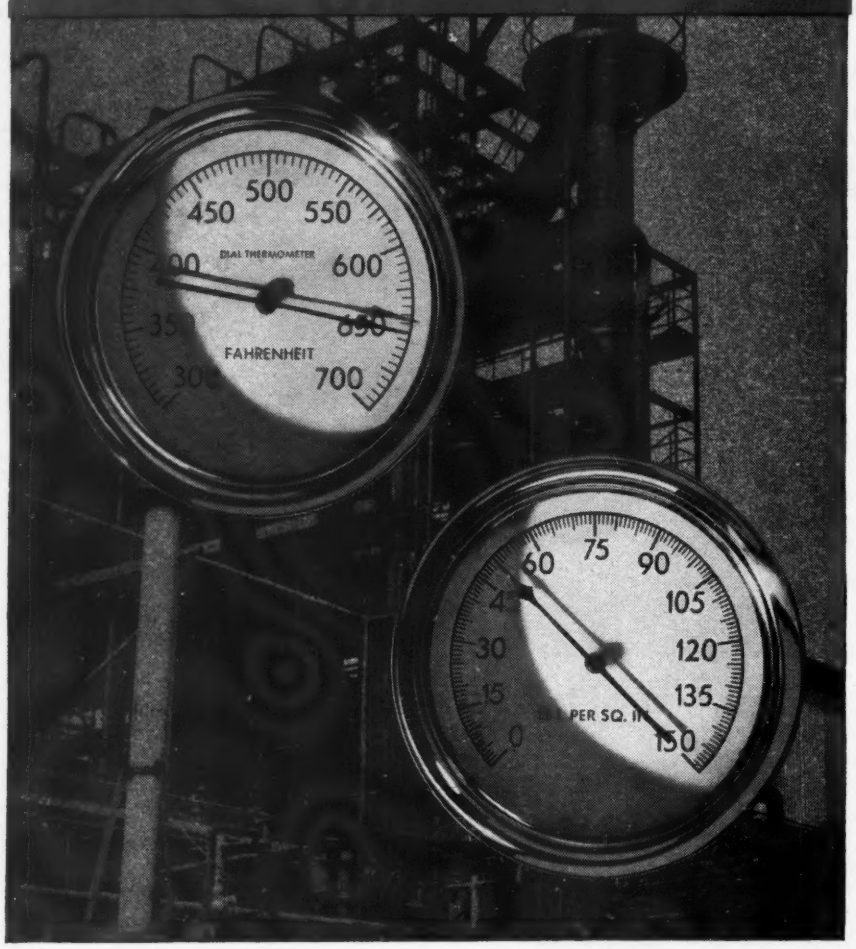
★

MERCK & CO., Inc.
Manufacturing Chemists
RAHWAY, N. J.

New York, N. Y. · Philadelphia, Pa.
St. Louis, Mo. · Chicago, Ill. · Elkton, Va.
Los Angeles, Calif. · *In Canada:* MERCK & CO., Ltd., Montreal · Toronto · Valleyfield

Dowtherm

the high-temperature, low-pressure heat transfer medium



taking the pressure off high-temperature heat processing problems

FROM THE MORE THAN 600 COMPANIES who are using Dowtherm installations today, have come countless enthusiastic endorsements of this dependable heat transfer medium.

One of the many important reasons for the great popularity of Dowtherm among its users is its ability to operate over a wide range of high temperatures at corresponding low pressures. A Dowtherm system is capable of temperatures as high as 700°F. involving a vapor pressure of only 88 lb./sq. in.

Dowtherm's capacity to function at lower pressures has resulted in vital savings in both man-hours and material. The necessity of a complicated and costly installation is eliminated—less hazardous and greatly simplified operation also result.

The owners of Dowtherm installations are equally enthusiastic about its other important properties; its ability to maintain close, accurately controlled temperatures, and its greater operating efficiency.

If your processing operations require precise low-pressure heating in the 300-725°F. range, investigate Dowtherm further. Write to Dow for complete information.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis
Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Ontario

CHEMICAL COMMENTS

Paints Made from Saran F-122 Latex Form Tough Protective Film

Plastic film protection is afforded by water-base paints made from Saran F-122 Latex. In this new Dow material, millions of plastic particles bond themselves together to form a tough protective film, even on wet surfaces. Paints made from Saran F-122 Latex are superior to average paints in their resistance to moisture, grease, oils and chemicals. Applied with either brush or spray to wood, fibreboard, metal or masonry, they dry extremely fast into a long-enduring gloss finish. Used in colors or clear, they are practical for both home and industrial use, particularly in the maintenance field.

Disinfectants Produced from Phenol Derivatives

Phenol derivatives are now being used in the manufacture of many disinfectants. These phenol products, produced by Dow, are known as Dowicides. They are noted for their high germ-killing powers which are largely retained in the presence of organic matter. Other important properties: excellent compatibility with cresols, pine oils, and soaps, and effectiveness under alkaline conditions. These qualities indicate the wide adaptability of Dowicides to the manufacture of bactericides and fungicides.

Propylene Glycol Used as Shortening Extender

The food industry is making increasing use of low-cost Dow propylene glycol because of its unusual properties as a solvent, humectant, preservative, and wetting agent. Through the wetting action of this highly purified material it has been found possible to extend the effectiveness of shortening in producing baked goods. Propylene Glycol aids in the dispersion of the shortening throughout the batch with a consequent saving of critical shortening not otherwise possible.

DOW

CHEMICALS INDISPENSABLE
TO INDUSTRY AND AGRICULTURE

PATENTS

ENGINEERING

Cereals Puffed by Use of Steam Under Pressure as Heating Medium—Edward D. Andrews, Akron, Ohio to Quaker Oats Co., Chicago, Ill. No. 2,414,185. Jan. 14, 1947.

Fish Processed in Floating Factory—Leonard B. Harris, Southold, N. Y. No. 2,413,918. Jan. 7, 1947.

Food Dehydrated in Unit Using Hot Air and Desiccant—Wright W. Gary to Filtrol Corp., Los Angeles, Calif. No. 2,414,642. Jan. 21, 1947.

Fruit Positioned and Pitted by Single Stage Mechanical Means—Ellsworth W. Carroll, San Carlos, Calif. to S & W Fine Foods, Inc., San Francisco, Calif. No. 2,413,861. Jan. 7, 1947.

Milk Strained While Being Emptied From Can Into Weighing Tank—Floyd B. Carkhuff, Binghamton, N. Y. to Rice & Adams Corp., Buffalo, N. Y. No. 2,413,742. Jan. 7, 1947.

Poultry Defeathered by Mechanical Means—George F. Jerome, Fort Wayne, Ind. Nos. 2,413,711 and 2,413,712. Jan. 7, 1947.

Sugar Beets and Like Freed From Stones by Mechanical Means While Being Flumed—Albert L. Cooper to Holly Sugar Corp., Colorado Springs, Colo. No. 2,414,721. Jan. 21, 1947.

Tomatoes Cored by Mechanical Means—William E. Urschel, Joe Richard Urschel and Gerald W. Urchel, Valparaiso, Ind. No. 2,414,493. Jan. 21, 1947.

FRUITS AND VEGETABLES

Dextrose Solutions Containing Non-Sugar Impurities Including Iron, Copper, Organic Impurities and Free Acid Purified by Passing Through Bed of Hydrogen Exchange Material and Subsequent Treatment With Acid-Adsorbing Resin—Abraham Sidney Behrman, Hilding B. Gustafson, and James C. Hesler to Infilco, Inc., Chicago, Ill. No. 2,413,676. Jan. 7, 1947.

Fruit-Flavored Sugar Mixture Formed Into Stable Non-Hygroscopic Brick—Alexander M. Zenzes, New York, N. Y. No. 2,414,131. Jan. 14, 1947.

Sugar Solutions Purified by Ion Exchange Treatment—Franklin Nathan Rawlings, Westport, Conn. to The Dorr Co., New York, N. Y. No. 2,413,844. Jan. 7, 1947.

Unfermented and Unfermentable Sugars Recovered From Saccharified Starch Solutions by Treatment With Alkaline Earth Metal Oxides and Hydroxides at Temperatures Ranging From About 0 to 40 Deg. C—Eduard Färber, New Haven, Conn. and James S. Wallerstein, New York, N. Y. to Overly Biochemical Research Foundation, Inc., New York, N. Y. No. 2,413,698. Jan. 7, 1947.

VITAMINS

Riboflavin Concentrates Prepared by Using Crystalline Lactose as Adsorbing Agent—Abraham Leviton, Washington, D. C. to United States of America. No. 2,413,055. Dec. 24, 1946.

Vitamin A Ethers Synthesized—Nicholas A. Milas, Belmont, Mass. to Research Corp., New York, N. Y. No. 2,412,465. Dec. 10, 1946.

Vitamin A Synthesized—Bishop C. Cornwell, New York, N. Y. No. 2,414,722. Jan. 21, 1947.

Vitamin B6 Made Fat-Soluble—John C. Keresztesy, Westfield and Joseph R. Stevens, Rahway, N. J. to Merck & Co., Inc., Rahway, N. J. No. 2,412,272. Dec. 10, 1946.

MISCELLANEOUS

Cream Adjusted to pH of 3.8 to 4.8, Heated to About 180 Deg. F. and Centrifuged to Concentration of From 80 to 95 Percent Milk Fat—Lloyd K. Riggs, Chicago, Ill. to Kraft Foods Co. No. 2,414,837. Jan. 28, 1947.

Flavoring Composition Made by Substantially Complete Hydrolyzation of Proteins to Amino-Acid Products by Hydrochloric Acid and Neutralization With Sodium Bearing Alkali—Lloyd A. Hall to The Griffith Laboratories, Inc., Chicago, Ill. No. 2,414,299. Jan. 14, 1947.

Gelatin Hydrosol Boiled in Presence of Phosphoric Acid to Form Chemically Stable Gelatin-Containing Product Which Maintains Fixed Fluidity at All Temperatures Down to Congealing Point—Albert A. Epstein, Carmel, N. Y. No. 2,413,815. Jan. 7, 1947.

Glycerine Made by Fermentation of Saccharified Starchy Materials—Arthur L. Schade to Overly Biochemical Research Foundation, Inc., New York, N. Y. No. 2,413,699. Jan. 7, 1947.

Glycerin Made by Fermenting Carbohydrates With Yeast in Presence of Magnesium Carbonate—Arthur L. Schade, New York, N. Y. and Eduard Färber, New Haven, Conn. to Overly Biochemical Research Foundation, Inc., New York, N. Y. No. 2,414,838. Jan. 28, 1947.

Thickening Agent Obtained by Water-Alcohol Extraction of Dehulled and Coarsely Ground Oats—Sidney Musher to Musher Foundation, Inc., New York, N. Y. No. 2,414,117. Jan. 14, 1947.

BASIC FLAVOR MATERIALS

FOR FOOD PRODUCTS MANUFACTURE

Solid Extracts

ST. JOHNS BREAD
SWEET ORANGE PEEL
LICORICE
FOENUGREEK
KOLA
MAPLE BASE
COFFEE

Oleoresins

CAPSICUM
GINGER
PAPRIKA
PARSLEY SEED
TONKA

ESSENTIAL OILS • AROMATIC CHEMICALS • SPICES
GUMS: TRAGACANTH, ARABIC, KARAYA, LOCUST

S. B. PENICK & COMPANY
50 Church Street, New York 7, N. Y. Telephone: COrtlandt 7-1970
735 W. Division St., Chicago 10, Ill. Telephone: MOHawk 5651

Imagine You

WEARING AN ASPHALT RAINCOAT!

● Probably you'd look terrible. But one thing is sure—you'd stay *dry!* For asphalt keeps out moisture. And that's why we use asphalt to help keep Diamond Crystal Salt dry, and prevent caking.

Salt usually cakes in excessive humidity, because moisture condenses on salt particles, forming a thin layer of brine. Then, in dry weather, the brine evaporates and the crystals knit together.

Our research laboratory has found a number of ways to help prevent salt caking. Removal of moisture-attracting impurities, such as calcium chloride, helps. So does complete removal of fines by careful screening. Most important is to provide salt with a moisture- and vapor-resistant package.

Take our Flour Salt bag, for example. It is composed of three 50-lb. and two 25-lb. sheets of kraft, laminated together with 40 lbs. of asphalt per ream. That's a lot of asphalt, and it costs us more money—but our moisture-vapor transmission tests show this bag is worth the extra cost. The bag is even sewn with *waxed thread* to seal the holes made by the sewing-machine needle. That's real *protection*—one reason we have been able to eliminate caking as a major problem!

Want Free Information On Salt? Write Us!

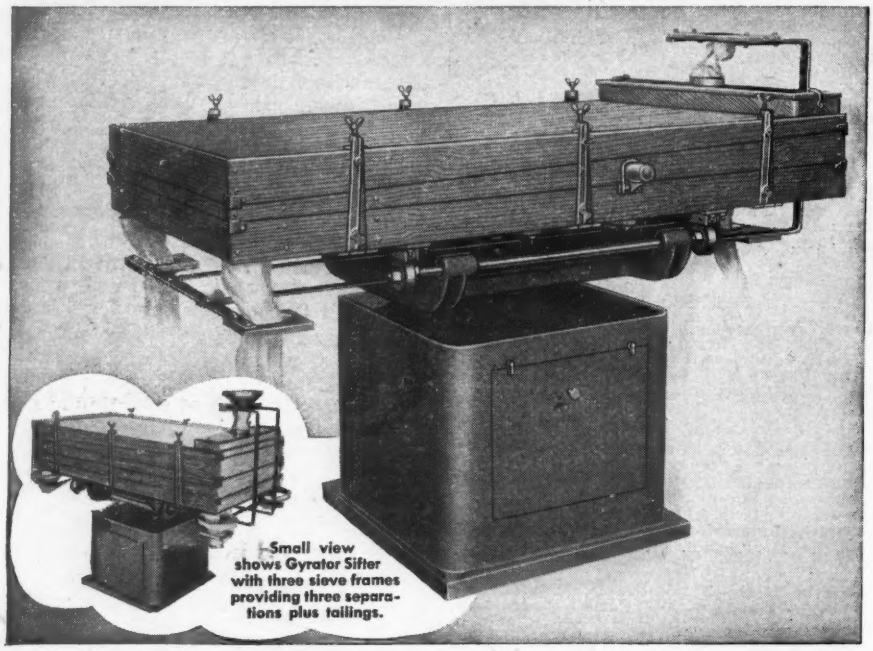
If *you* have a salt problem, write our Director of Technical Service. He will be happy to help! Diamond Crystal Salt, Dept. J-13, St. Clair, Mich.

DIAMOND CRYSTAL ALBERGER PROCESS SALT

Schutz O'Neill

GYRATOR SIFTER

For sifting SPICES,
DRUGS, HERBS, CHEMICALS,
and hundreds of other ground materials.



Small view shows Gyrator Sifter with three sieve frames providing three separations plus tailings.

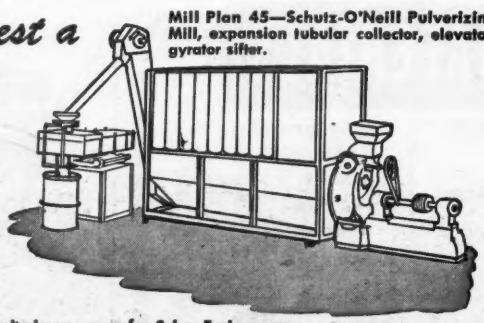
You can count on a Schutz-O'Neill Gyrator Sifter to turn out a near-perfect separation and deliver a large volume of uniform product free from tailings, fibre, shreds or foreign particles. The continuous whirling motion of the material as it moves forward upon the sieve's surface produces this clean separation.

Built with one to four sieve frames, the Gyrator Sifter will deliver up to four grades of product. Sieve meshes are kept free by means of light-weight, loose-sliding chains, always in motion, and knockers which constantly tap the sides of the boxes. When you change the product to be ground, sieves are quickly removable, and can be thoroughly cleaned in a few minutes. Very light running—requires only 1 to 2 H. P. motor.

Let Us Suggest a

MILL PLAN

If you will write us your requirements, sending sample of products to be sifted or pulverized and output desired, our engineers will recommend the correct equipment for your use at no obligation.



Mill Plan 45—Schutz-O'Neill Pulverizing Mill, expansion tubular collector, elevator, gyrator sifter.

Some territories are open for Sales Engineers on Schutz-O'Neill products. Write, stating qualifications

ESTABLISHED 1893

SCHUTZ-O'NEILL CO. DIVISION OF PARTEN MACHINERY CO.

PULVERIZERS • BREAKER MILLS • ROLLER MILLS • BURR MILLS • HAMMER MILLS

309 SIXTH AVENUE SOUTH • MINNEAPOLIS 15, MINNESOTA

Sterilization

(*Continued from page* 116)

duration, on the average, than processes in which the food is heated in bulk.

Prospects for Use of High-Short Sterilization

High-short sterilization of low-acid foods with the use of steam or water for heating is on the threshold of a period of rapid development. This means that one of the most interesting periods in all the history of food processing is just ahead, and it will be made doubly interesting should this development be accomplished by practical application of high-frequency electrical sterilization.

Reference

Anon., Factors Contributing to Uniform Heat Distribution in Retorts. Sup. of N.C.A. Information Letter, No. 934, 1-4, 1943.

C. O. Ball, Equipping and Controlling Retorts. *Canner,* 58, No. 4, 33; No. 5, 23, 1924.

C. O. Ball, Advancement in Sterilization Methods for Canned Foods. *Food Research,* 3, Nos. 1 and 2, 13-55, 1938.

I. I. Somers, How to Vent Steam Retorts to Remove the Air Hazard. *Food Industries,* 16, 93-96; 164-166, 1944.

Correction

A typographical error appears in Part I of Dr. Ball's article published in the January issue of Food Industries. The sentence 19 lines from the top of page 192, commencing "Localized combinations . . ." should read:

"Localized combinations of air and steam that are not in equilibrium can exist in a retort simultaneously with many other localized combinations that actually do satisfy equilibrium conditions, while each of the latter can contain saturated steam at a temperature that is different than temperatures in other parts of the retort."—The Editors.

—End—

Maturity of Peas

(*Continued from page* 84)

that maturity has a bearing on the quality of the product because of its effect on the sugar content, and that there is a range in maturity where sugar content tends to be at a maximum.

Among vegetables commonly frozen, peas rank high in protein content. The relationship between maturity of raw peas, as estimated by the tenderometer, and the pro-

FOR ECONOMY IN REFRIGERATION

CORK

THE OUTSTANDING VALUE and dependability of cork insulation is a matter of record—proved in actual service for more than forty years.

The largest users of refrigeration rely upon CORK for long service and money-saving operation of storage, aging and processing rooms, sharp freezers and other refrigerated areas.

Mundet Corkboard utilizes the nature-made superiority of CORK. In addition to its extremely low conductivity, Mundet Corkboard is structurally strong and stable. Its compressive strength and resiliency make it an excellent construction material. Light-in-weight, it handles easily; cuts economically; permits tight-fitting joints that give excellent protection to low temperature rooms.

The Mundet cork insulation manual will be sent free on request. Mundet Cork Corporation, Insulation Division, 65 So. Eleventh Street, Brooklyn 11, N. Y.

Mundet district offices are located in these cities:

ATLANTA
339-41 Elizabeth Street, N.E.

BOSTON
57 Regent St., North Cambridge 40

CHICAGO 16
2601 Cottage Grove Avenue

CINCINNATI 2
427 West 4th Street

DALLAS 1
505 Southland Life Annex

DETROIT 21
14401 Prairie Street

HOUSTON 1
Commerce and Palmer Streets

JACKSONVILLE 7, FLA.
1212 Mary Street

KANSAS CITY 7, MO.
1428 St. Louis Avenue

LOS ANGELES
(Maywood)
6116 Walker Avenue

NEW ORLEANS 16
315-25 N. Front Street

PHILADELPHIA 39
856 N. 48th Street

ST. LOUIS 4
2415 South Third Street

SAN FRANCISCO 7
440 Brannan Street

In Canada:
Mundet Cork & Insulation, Ltd.
35 Booth Avenue, Toronto

Write us for name of our nearest representative if there is no Mundet office in your city.

MUNDET
CORK INSULATION

Need Skilled Labor?

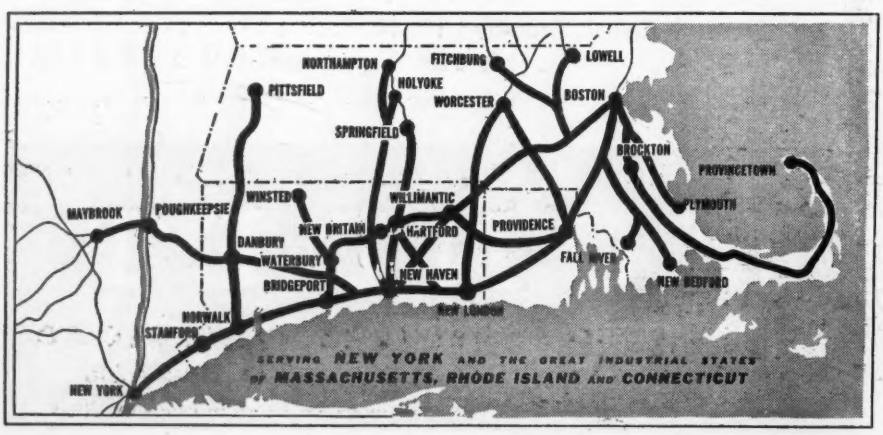
1,743,826 skilled workers live and work in Southern New England.

If your business requires skilled labor, here is a fact worth remembering: 10% of all industrial workers in the U. S. live in Southern New England . . . more skilled workers per thousand population than any other part of the country!

The availability of skilled labor is only one of the many advantages of locating your plant in Southern New England.

For a complete, concise resume of *all* the advantages that New England has to offer, write for the new, 32-page illustrated booklet, SOUTHERN NEW ENGLAND FOR TOMORROW'S INDUSTRY. Address: P. E. Benjamin, Mgr., Industrial Development, New Haven R. R., Room 201K, 80 Federal Street, Boston 10, Mass.

THE **NEW HAVEN** R. R.



tein content of the frozen material is presented in Fig. VI. It is apparent that the protein content increases in a curvilinear manner with increase in maturity. These results are in agreement with those of Jodidi and Boswell,[10] who observed that the total nitrogen and protein nitrogen of Alaska peas increase with maturity. Possible use as an index of maturity is indicated by the figure.

Although Fig. VI suggests a high degree of correlation between maturity of raw stock and protein content of the frozen product, it is doubtful that this relationship can be used satisfactorily as an index of quality in commercially frozen peas. The limitations are those of time and technic required for a determination.

Fat Content

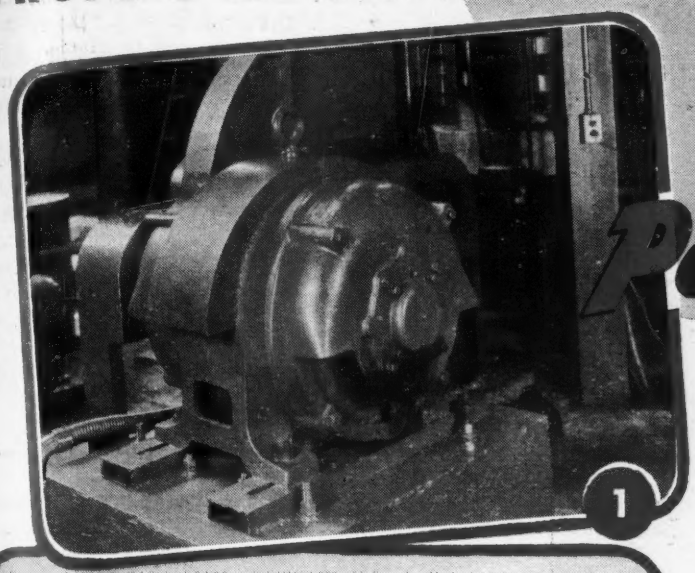
Jodidi and Boswell have reported that the fat content of Alaska peas increases with maturity. The scatter diagram in Fig. VII indicates that lipid content of frozen peas increases rapidly in the early stages of maturity and then levels off. This relationship cannot be used satisfactorily as an index of maturity because of the leveling off of the curve and spreading of the values above a tenderometer reading of 105, as shown in Fig. VII.

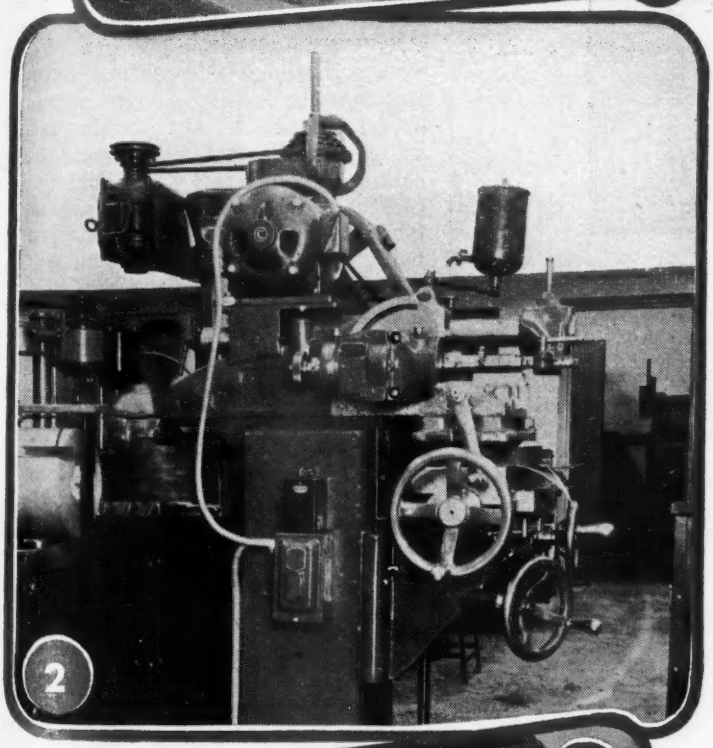
References*

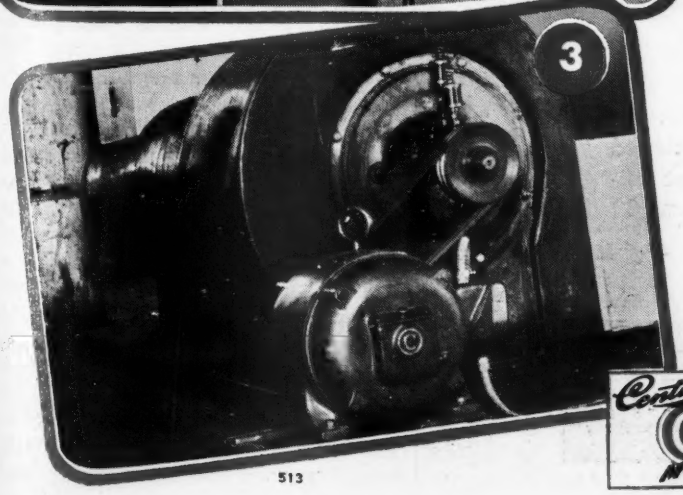
1. Western and U. S. Frozen Vegetable Packs by Years, *Western Canner and Packer*, 38: 296, 1945.
2. J. P. Nielsen, Rapid Determination of Starch: An Index to Maturity in Starchy Vegetables, *Industrial and Engineering Chemistry*, Anal. Ed., vol. 15, 176-179, 1943.
3. J. P. Nielsen and P. C. Gleason, Rapid Determination of Starch; Factors for Starches and Comparison with Acid and Enzymic Hydrolysis Methods, *Industrial and Engineering Chemistry*, Anal. Ed., vol. 17, 131-134, 1945.
4. W. Z. Hassid, Determination of Sugars in Plants by Oxidation with Ferricyanide and Ceric Sulfate Titration, *Industrial and Engineering Chemistry*, Anal. Ed., vol. 9, 228-229, 1937.
5. Official and Tentative Methods of Analysis, *Association of Official Agricultural Chemists* (Ed. 5), 1940, 757 p.
6. J. P. Nielsen and G. S. Bohart, Determination of Crude Lipid in Vegetable Matter, *Industrial and Engineering Chemistry*, Anal. Ed., vol. 16, 701-703, 1944.
7. F. A. Lee, Determining the Maturity of Frozen Peas. A Rapid Objective Method, *Industrial and Engineering Chemistry*, Anal. Ed., vol. 13, 38-39, 1941.
8. F. A. Lee, Objective Method for Determining the Maturity of Peas with Special Reference to the Frozen Product, New York State Agricultural Experiment Station Technical Bulletin, 256, 1941.
9. W. M. Martin, The Tenderometer, Research Dept., American Can Company, Maywood, Ill., 12 p., 1937.
10. W. M. Martin, R. H. Lueck and E. D. Sallee, Practical Application of the Tenderometer in Grading Peas, *Canning Age*, vol. 19, 146-149, 193-196, 1938.
11. E. P. Walls and W. B. Kemp, Relationship Between Tenderometer Readings and Alcohol Insoluble Solids of Alaska Peas, *Proceedings of American Society Horticultural Science*, vol. 36, 729-730, 1939.

For All Popular Applications — In Any Atmosphere

There's a CENTURY Motor That Provides TOP Performance







513

Century builds a complete line of electric motors, fractional and integral horsepower, in all popular sizes to meet the requirements of industrial production, commercial needs and appliances.

The many types provide satisfactory performance for practically any electric power requirement. To meet any kind of surrounding hazard, Century motors are built with open, splash proof, totally enclosed fan cooled or explosion proof frames.

Typical examples of the variety of applications are shown in the three photographs.

Illustration number 1 shows a Century 75 horsepower general purpose drip proof motor driving a coal pulverizer in a large industrial plant. The drip proof construction protects against falling objects or dripping liquids.

Number 2 shows a 1 horsepower Century open rated general purpose motor driving a milling machine in a tool room where extreme accuracy must be maintained. Protection isn't needed here because the motor is mounted on top of the machine—and in clean surroundings.

Number 3 shows a 1½ horsepower Century totally enclosed motor driving a blower on a gas heated oven for paint drying.

Whatever your requirements may be, there is a Century motor to accurately meet the needs of your job — and provide top performance.

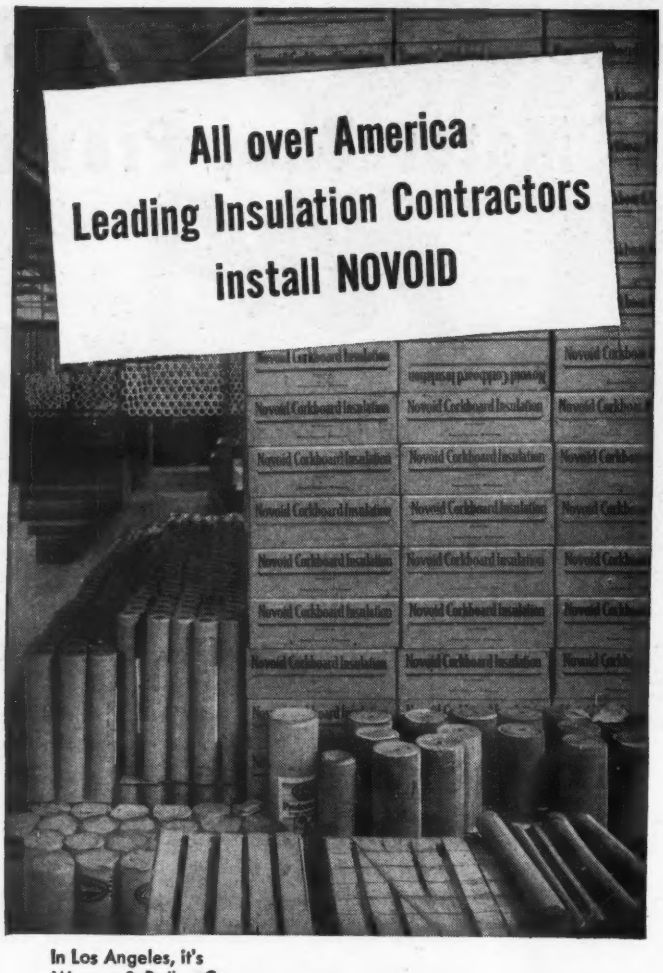
Specify Century for all your electric power requirements.

Century C MOTORS

CENTURY ELECTRIC CO.

1806 Pine St., St. Louis 3, Mo.

Offices and Stock Points in Principal Cities



In Los Angeles, it's
Warren & Bailey Co.,
350 S. Anderson St.

PROMPT DELIVERY of Novoid Cork Pipe Covering can now be obtained through good insulation contractors throughout the U. S. Many Novoid contractors maintain warehouse stocks for immediate installation.

Novoid Covering is the moulded rigid insulation that efficiently reduces your cost of refrigeration. It snugly hugs pipes and fittings of every size and shape, does not sag, does not absorb moisture or odors, and is long-lasting.

For complete facts about Novoid Pipe Covering, Corkboard, and sundries specially developed to make low-temperature insulations most efficient, write to Cork Import Corporation, 39 Park Place, Englewood, N. J.

NOVOID INSULATION

CORKBOARD · PIPE COVERING

12. M. M. Boggs, H. Campbell and C. D. Schwartze, Factors Influencing Texture of Peas Preserved by Freezing II. *Food Research*, vol. 8, 502-515, 1943.
13. V. R. Boswell, Chemical Changes During the Growth and Ripening of Pea Seeds, *Proceedings of American Society Horticultural Science*, vol. 21, 178-187, 1924.
14. Z. I. Kertesz, The Chemical Changes in Peas after Picking, *Plant Physiology*, vol. 3, 399-412, 1930.
15. W. B. Adams and G. Horner, The Effect of Blanching on the Nutritive Value of Canned Vegetables I. Univ. Bristol, Fruit and Veg. Press. Res. Sta. Campden, Ann. Rept., 1941, pp. 21-31.
16. S. L. Jodidi and V. R. Boswell, Chemical Composition and Yield of the Alaska Pea as Influenced by Certain Fertilizers and by the Stage of Development, *Journal of Agricultural Research*, vol. 48, 703-736, 1934.

* Other references following Part II of this report.

—End—

Canners Convention

(*Continued from page* 95)

Jersey Machine Company, attracted much attention. The method does not use a wet paste or pick-up gum. Rather it involves the use of a label with a thermoplastic coating material on its back. Lifted from the pile of fresh labels by suction through an electrically heated platen, the coating becomes tacky and holds its tackiness for several minutes. The label is deposited on the container being labeled, and wiped down.

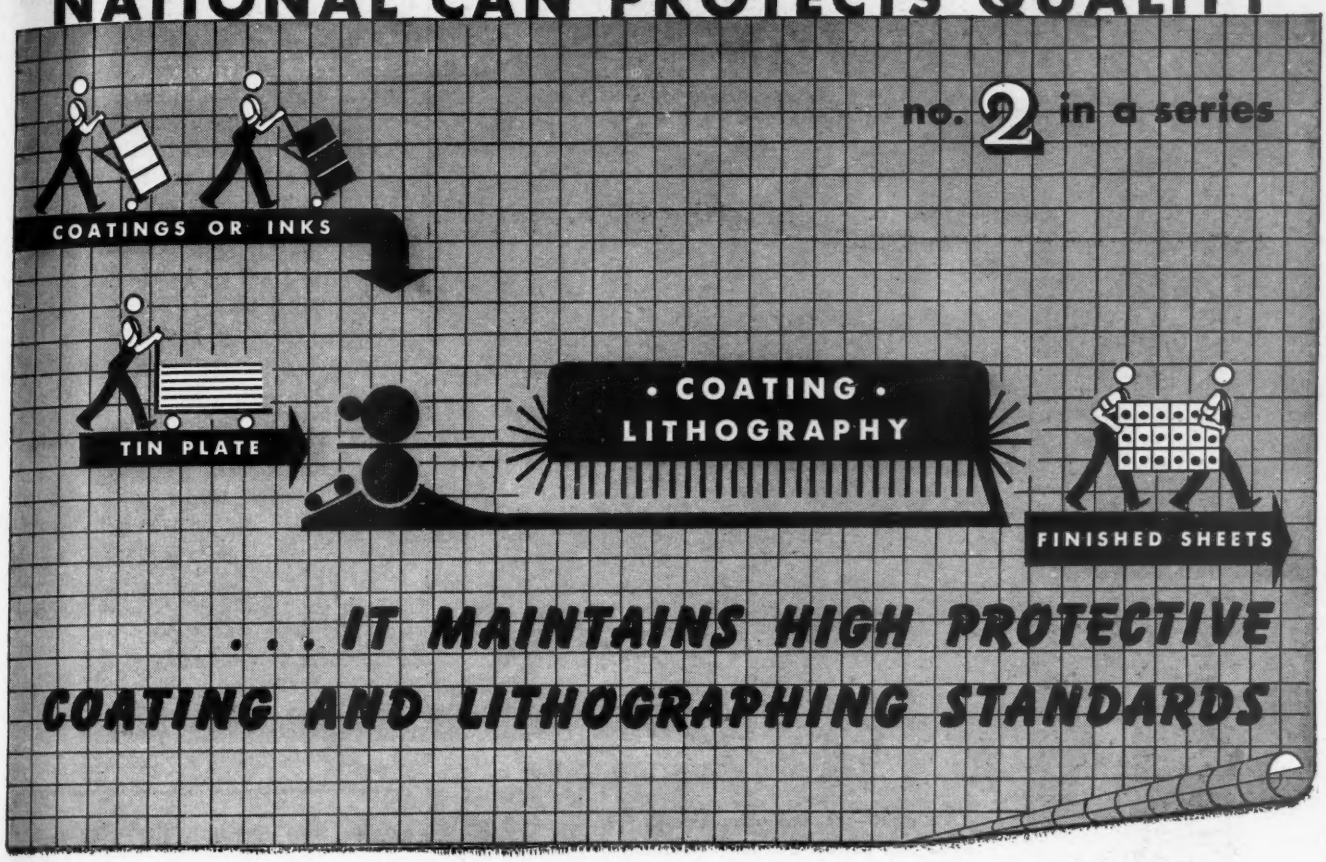
Reynolds Metals Company displayed paper-backed, lithographed foil can labels that are moisture proof, waterproof and winkle proof. The Reynolds Company, by the way, now concentrates on the heavier foils, and has ceased making 0.0003 to 0.0005 gage foil. Aluminum Company of America is now the main source of these very thin foils, which has placed an unusual burden on its rolling facilities.

Alcoa displayed its latest model of roll-on bottle caps and sealers. These caps are in heavy current demand for a curious reason. Price resistance has diverted liquor purchasers from quarts to pints, doubling the demand for caps, for liquor consumption has not declined.

Fiber Pallet

There was always a large crowd around the Clark Tructractor exhibit to see Clark's answer to the pallet problem. Instead of the customary pallet, Clark now uses a piece of fiber or heavy corrugated board of the size of a pallet, but costing only about eight cents each. On the lift, which is really now a "plate" lift instead of a fork lift, is a gadget that will grip the pallet and pull it onto the lifting plate together with its load. Or it will

NATIONAL CAN PROTECTS QUALITY



When you have a metal container to be coated inside for protection, coated outside for decoration, lithographed outside for design and labeling, our long experience and expert knowledge will help you in many ways. We see to it that an inert lining, when needed, not only serves to preserve the product but also to safeguard the container itself, protecting it against corrosion. As the job may require, we carry out one or more of the successive steps of cleaning tin plate, applying a lacquer base coating, printing color by color with baking-in of each, and applying a finish of lustre and protection.

Our own artists, color specialists and photographers round out a coating-lithographing staff that includes skilled pressmen whose expert makeready and precise adjustment techniques insure perfect register in multiple impressions.

Further advertisements will feature, in the order of their occurrence, other examples of how National Can protects quality.

NATIONAL CAN

CORPORATION

Executive Offices: 110 EAST 42nd STREET, NEW YORK 17, N. Y.

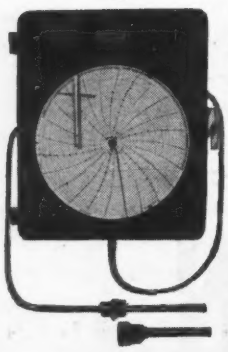
SALES OFFICES AND PLANTS IN: BALTIMORE, MD. · CHICAGO, ILL. · HAMILTON, OHIO · BOSTON, MASS. · INDIANAPOLIS, IND. · MASPETH, N. Y. · McKEESPORT, PA. · ST. LOUIS, MO.

All right—we are exaggerating. We'll admit that even this newest Palmer Thermometer at street level could hardly be read from the top of a skyscraper. But it's not such a terrible exaggeration at that. The "Red-Reading-Mercury" column in this new and finer Thermometer *can* be read more accurately—at a far greater distance than the ordinary instrument, even through smoke, steam and mist!

That's because the new Extruded Brass Case NOW makes possible a much larger reading scale. Other important features are: Double-strength, non-rattling glass shield; "Snap-On" cap for easy removal of shield; fume-resistant and dust-proof case. For full details write for Bulletins No. 46-2 and No. 46-3.

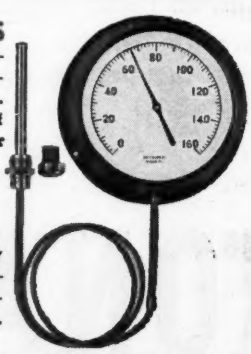
AND REMEMBER — specify this new thermometer on original equipment purchased from your jobber or equipment manufacturer—there should be no extra charge!

PALMER SUPERIOR RECORDING and DIAL THERMOMETERS



RECORDING THERMOMETERS

Extremely Accurate and sensitive. Constructed for long service. Mercury Actuated, 12 in. die-cast aluminum case. Flexible armoured tubing and bulb of stainless-steel. All ranges up to 1000F. or 550C.



DIAL THERMOMETERS

Mercury Actuated. 8 in. case. Very sensitive. Permanent accuracy guaranteed. Built for long life. Flexible armoured tubing and bulb of stainless-steel. All ranges up to 1000F. or 550C.

MFRS. INDUSTRIAL, LABORATORY, RECORDING AND DIAL THERMOMETRS

PALMER THERMOMETERS INC.

2529 NORWOOD AVENUE
CINCINNATI 12, OHIO

Canadian Plant: King and George Sts., Toronto 2

shove the load off, together with its pallet, from the lifting plate.

Speaking of fork lift trucks, two wholesale distributors were overheard discussing their new warehouse operations destined to make a deep cut in their distribution costs. One chap said his firm had thought of everything except to make the doors wide enough in the cheese and butter cooler and the cigarette room to admit a fork-lift truck. They learned of their error in the first day of operation but the door widening operation must be postponed for another year.

Sanitation was the big talking point in most preparation equipment exhibits and in half of the papers presented at the technical sessions. The strides made by equipment builders have been notable, but all admit that there remains much to be done before the ideal in sanitation is attained.

—End—

New Products

(*Continued from page* 77)

come from and how they are evaluated. Those who follow statistics on population trends know that this country is aging. As the years go by, the percentage of oldsters is increasing and will increase. Just as there are special foods for babies, so there is a logical reason for special foods for the aged. This was recognized by the sales division concerned.

The sales manager and his assistants made a study of the subject, consulting with physicians who specialized in the treatment of old people. Those qualified for the "Three Score and Ten Club" form a definite nutritional class. As a rule they are not physically very active, so they do not need the calories younger people do. Eating less, they are unlikely to get their daily requirements of essential vitamins and minerals.

So was born the idea that a suitable modified and fortified dried milk could be prepared. Reconstitute this so that two drinks a day and the old folks would be fully fortified with their daily needs of vitamins and minerals. Having studied and digested the specialists' views, they came to the laboratory with the requirements of what they wanted on the reconstituted basis. The problem of adjusting the proportions of fat, protein, and lactose fortunately proved to be simple. In choosing in what form the added minerals should be added there are

AUTO-LITE TEMPERATURE INDICATION

Engineered precision and built-in reliability are features that distinguish Auto-Lite Indicating Thermometers. These instruments are now available in popular dial-type models, designed especially for incorporation in food freezers, cold-holding cabinets and dispensing units. Not just an accessory, but basic equipment, Auto-Lite Thermometers on your freezers and cabinets assure safer storage for refrigerated perishables, more complete service from low temperature units. Prospective purchasers of cabinets appreciate the extra assurance of safety afforded by equipment that includes Auto-Lite temperature indicating instruments. Send for illustrated descriptions.

THE ELECTRIC AUTO-LITE COMPANY

INSTRUMENT AND GAUGE DIVISION • TOLEDO 1, OHIO

New York Office: Chrysler Building • Chicago Office: 600 S. Michigan Boulevard

AUTO-LITE FOR ACCURACY

Dependable service is assured by Auto-Lite construction. There is no intricate mechanism to get out of order.

Auto-Lite Thermometers have capillary tubing for remote reading. This permits the dial to be mounted for most convenient observation. Auto-Lite Thermometers are priced low, due to specialized Auto-Lite production methods.

In addition to many types of thermometers and gauges, Auto-Lite facilities are available for the production of instruments of special design for use in manufacturers' equipment. Details on request.

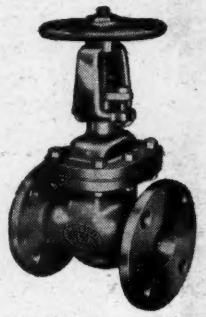
AUTO-LITE MEANS PRECISION MANUFACTURING

AUTO-LITE INDICATING & RECORDING **THERMOMETERS**

TUNE IN THE AUTO-LITE RADIO SHOW STARRING DICK HAYMES—THURSDAYS, 9:00 P. M.—E. T. ON CBS

CHOOSING THE *RIGHT* VALVE IS *HALF* THE CORROSION FIGHT

Increased wage and materials costs have boosted maintenance charges greatly. That is why now, more than ever before, it pays to use enduring materials. This is particularly true of values in pipe lines subject to corrosion or contamination. Choosing the one *right alloy* for a given application requires plenty of experience. We devote our entire engineering and production facilities to the manufacture of the best *corrosion-resistant valves* it is possible to make. Consult us on your requirements.

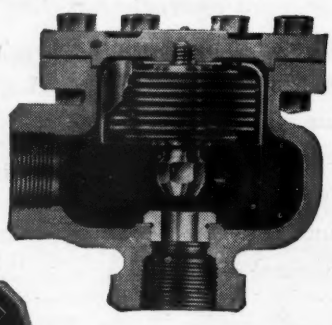


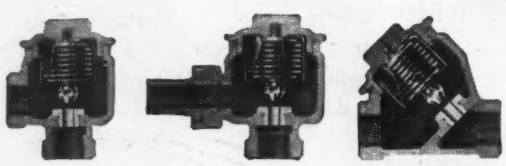
GATE VALVE NO. 111

ALLOY STEEL PRODUCTS COMPANY, INC.
1305 WEST ELIZABETH AVENUE — LINDEN, NEW JERSEY

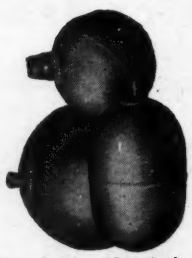
Tighten Your Quality Controls
with NICHOLSON
'Positive-Action' STEAM TRAPS

Featuring 2 to 6 times average drainage capacity, as well as freedom from air-binding, freeze-ups and water-logging, Nicholson steam traps afford a positive fast action that increasingly recommends them for removing process variables.





Nicholson thermostatic steam traps are furnished in 5 types for any processing, power or heat application. Sizes ¼" to 2"; pressures to 225 lbs. Details and piping plans in Catalog 444, or see Food Industries Catalog.



One of America's largest makers of welded floats for processing purposes. All sizes and shapes. Send for Bulletin 746.

W. H. NICHOLSON & CO.
193 OREGON ST., WILKES-BARRE, PA.
Valves • Traps • Steam Specialties

various considerations. Calcium and phosphorus never seem to be in quite the proportions you need in any of the many calcium phosphates. Iron must be in physiologically active form. When you come to the vitamins, once again you have to choose. For instance you can use carotene and irradiated ergosterol, or else a suitable fish-oil concentrate for A and D. You must consider whether to add synthetic thiamin and riboflavin or use a special yeast containing them in the right proportions, with the added advantage of the presence of other members of the B complex. You must determine what loss of vitamins, especially A and C, will occur in processing and in storage, and allow an overage accordingly.

Trial Batch

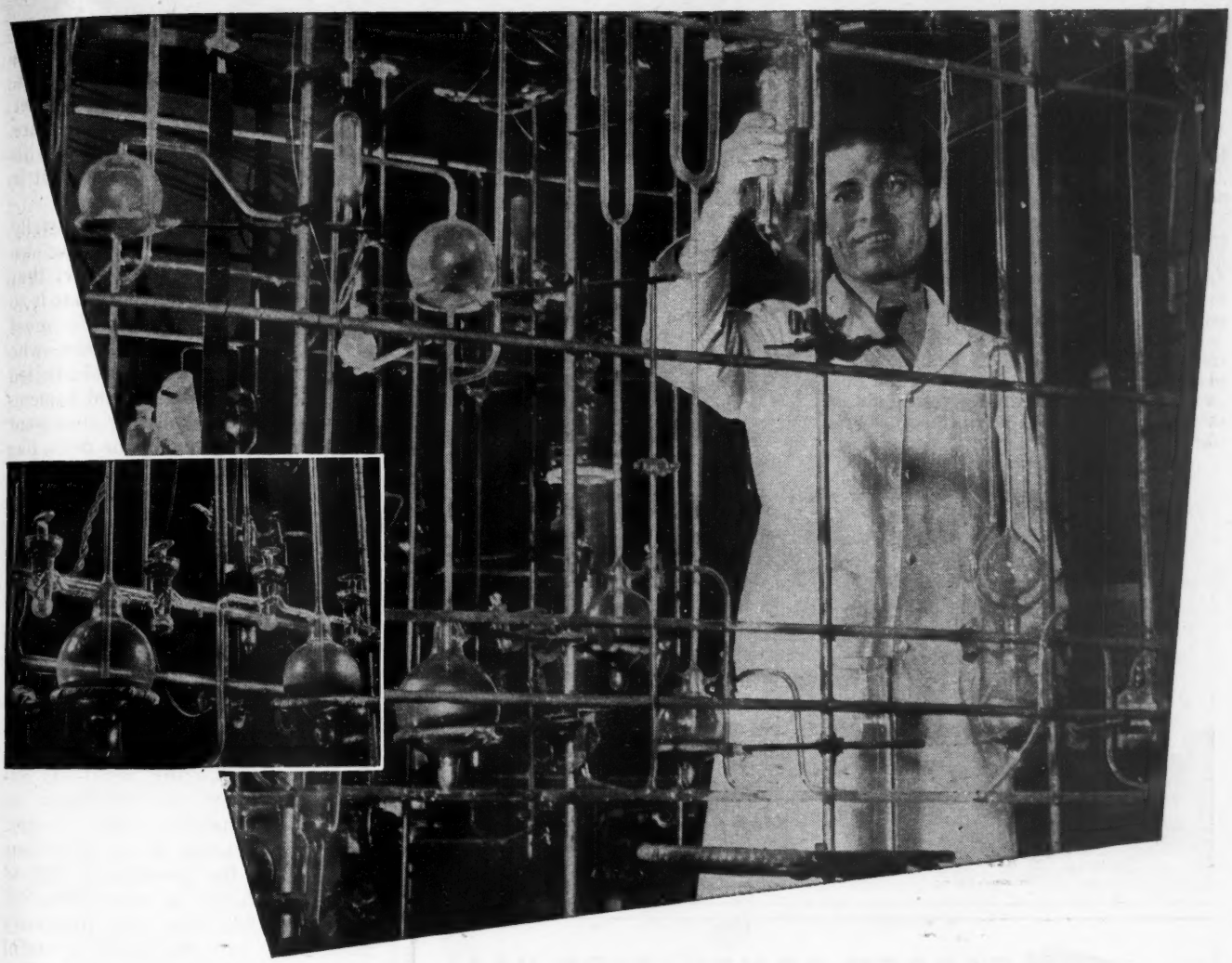
All this had to be and was studied on a pilot plant scale in the laboratory. The method of drying was specified by the sales department, and we ended up by preparing, condensing, and spray drying a small batch. This gave us a good idea of the flavor of the product and how it would stand up on storage.

Unfortunately our laboratory spray drier does not give the same bulk of powder as a commercial unit. Accordingly, the next step from our twenty pounds or so on the pilot plant was to five hundred pounds in a regular plant drier. This gave a product which could be tested clinically and also enabled the size of the containers to be determined and the label instructions to be prepared—so many level teaspoons to so many ounces of water.

A product of this type must be tried out in practice before general marketing begins. Hence it was tested in several homes for the aged under medical supervision, so we would know its acceptability to the consumer and to the physician. Meanwhile, of course, checks were made on the stability of the vitamins. Now, "Gerilac," as it was named, is available at drug stores in ever widening territory and the Townsend Clubs should increase in vigor and longevity.

Test Marketing

Of course, any new product is normally tried out first on a limited scale in one or more test markets. This follows pretty thorough tests on one's fellow workers and on the guinea pigs in general in the building, possibly with surveys made on the general public by the advertising agency which is handling the product. Thus there are several checks on bugs which may arise



It's the extras you may never need that count most

It's a matter of record that Corning builds into PYREX stopcocks more service than you may ever need. These stopcocks embody all the refinements that 29 years of research have developed.

Sturdy outer shells and heavy side arms are expertly welded together by rugged seals, perfectly annealed. The solid plugs are made of No. 774 glass, the same "balanced" chemical glass used for the shells (and all of your other PYREX laboratory glassware). Each part is accurately ground to assure interchangeability and to make possible a quick, simple lapping operation if vacuum service is indicated.

Such inbuilt quality by Corning means . . .

1. Long service life
2. Smooth operation, minimum of "freezing"
3. Dependability in tough service
4. Easy replacement of parts

Look for the PYREX trademark on *both* shell and plug. It assures you of the finest stopcocks that years of experience can produce. Consult your dealer on your stopcock requirements. He stocks PYREX brand laboratory ware for you. For latest price information write us today for your copy of Supplement No. 3 to Corning Catalog LP-24.

CORNING GLASS WORKS
TECHNICAL PRODUCTS DIVISION
CORNING, NEW YORK

LABORATORY GLASSWARE OPTICAL GLASS GLASS COMPONENTS
GLASS PIPE GAUGE GLASSES LIGHTINGWARE SIGNALWARE

CORNING means research in GLASS

T. M. REG. PYREX U.S. PAT. OFF.

—the mark of Corning Craftsmanship

LABORATORY GLASSWARE

. . . stocked by leading laboratory supply houses

"PYREX" IS A REGISTERED TRADE-MARK AND INDICATES MANUFACTURE BY CORNING GLASS WORKS, CORNING, N.Y.

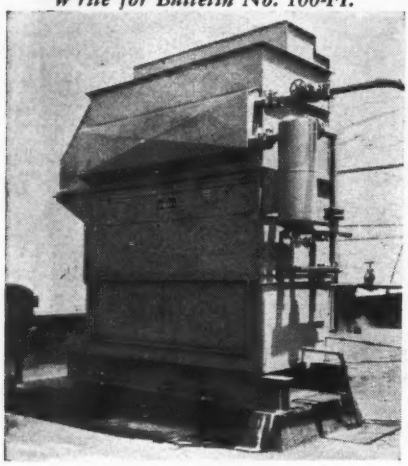
NIAGARA LIQUID COOLER
Gives High Capacity in Small Space

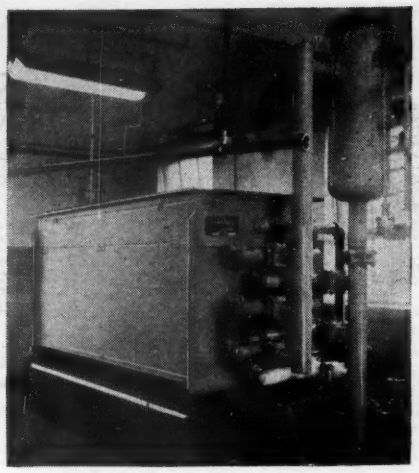
Cold water, chilled to 33° F., or cold liquids, or non-freezing solutions below 32° F. are produced economically by the new Niagara Liquid Cooler.

For large capacity equipment it is most compact. For example, one model furnishes 92 G. P. M. of water cooled from 45° F. to 35° F., with 28° F. refrigerant, in less than 30 sq. ft. of floor space. Other models . . . 24 to 465 G. P. M.

Extra advantages positive temperature control; assurance of holding temperature accurately in spite of variation in cooling load; rapid chilling of liquid; savings in power and refrigeration consumption.

Write for Bulletin No. 100-FI.





NIAGARA Aeropass CONDENSER

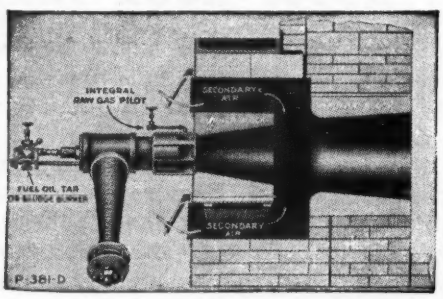
. . . increases plant capacity for refrigeration users, saves power, saves condenser water. "Duo-Pass" (patented) reduces condensing temperature, prevents scaling and clogging of condenser tubes. "Oilout" (patented) removes oil and dirt from refrigerant, assuring full capacity.

Write for Bulletins 91-FI and 103-FI

NIAGARA BLOWER COMPANY
"30 Years of Service in Industrial Air Engineering"
405 Lexington Av., New York 17, N. Y.
Field Engineering Offices in Principal Cities

NATIONAL AIROIL FUEL OIL - GAS BURNERS

TANDEM COMBUSTION UNIT



can be brought, quickly, to full capacity with a clean flame

It maintains a high flame temperature with either fuel oil or gas; has a high turndown ratio with a steady flame; and flame can be regulated and directed to uniformly radiate heat to the absorbing surfaces without flame impingement.

The Tandem Combustion Unit is also designed for firing vertically upward and for forced draft preheated air, when necessary. It can be applied to all types of boilers and process furnaces. For details about the Tandem Combustion Unit and the various types available, write

NATIONAL AIROIL BURNER CO., INC.

Main Offices & Factory: 1272 EAST SEDGLEY AVENUE, PHILADELPHIA 34, PA.
Texas Office: 2nd National Bank Bldg., Houston

and you can get these eliminated without alienating good will. One thing must be remembered: introducing a new product to the market is a tough job at best. If there proves to be something wrong with it, it is almost impossible to put it over at a second attempt.

Since we are dealing primarily with food products, whatever we make must have good flavor, that "come-again" appeal. We want it to be nutritious as a rule, but it must taste right. Those readers who went to Sunday School and studied the Book of Daniel should remember that Nebuchadnezzar once went crazy and ate grass in the fields like a cow. One inspired poet wrote of this:

> "Thus quoth the monarch, as he chewed the unwonted food,
> 'It may be wholesome, but it is not good'."

In these lines there lies the main secret of a successful new food product. First, and emphatically first, it must taste right. It must be wholesome too, but unless it has good flavor it will have no market. Eye appeal—looking right—is advantageous but not absolutely essential — consider the oyster. Whether it needs to be nutritious depends on the product. A cup of coffee, a flavor, a spice blend, a cocktail—they are not primarily nutritious, but they have a useful function in the diet.

—End—

Milk Processing

(*Continued from page* 111)

lic health, effective quality control must not only be embraced in principle but actually put into practice. "Quality is never an accident. It is always the result of intelligent effort. There must be a will to produce a superior article."

Stabilizing the Market

With the growing consciousness of the importance of product quality and with production reallocation trends becoming apparent (Table II), both present and potential supply and demand for milk and milk products provide incentives to establish and assure an increased market stability.

Technologists, as well as managements, will give careful thought to all incidental processing "arts", not only to retain present consumption trends, but to expand present markets. These objectives will be attained by increasing the quantities

News, Advertising, Readership Devoted to Building a Better Civilization

"Advertisements in our favorite newspaper certainly make shopping easier"

Time and again, readers of THE CHRISTIAN SCIENCE MONITOR plan their shopping trips around the merchandise advertised in this newspaper. That is one of the reasons why a regular MONITOR advertiser writes: *"It has been a great pleasure for us to get acquainted with your readers, and on many occasions they have let us know that they appreciate our merchandising through your paper, and they have showed their appreciation by becoming steady customers for our products."*

Advertising response from this newspaper is often remarkable. MONITOR readers recognize the reliability of its columns, and these readers are able to buy in volume.

The most effective means of reaching this market is through regular advertising in THE CHRISTIAN SCIENCE MONITOR. May we give you full information about the MONITOR MARKET? A telephone call or letter will bring this information promptly. THE CHRISTIAN SCIENCE MONITOR, One, Norway Street, Boston 15, Massachusetts.

Branch Offices
NEW YORK: 500 Fifth Avenue
CHICAGO: 333 N. Michigan Avenue
DETROIT: 3-101 General Motors Building
KANSAS CITY: 1002 Walnut Street
SAN FRANCISCO: 625 Market Street
LOS ANGELES: 650 S. Grand Avenue
SEATTLE: 824 Skinner Building
PARIS: 56 Faubourg Saint Honore
LONDON, W. 1: 21-23 Shaftesbury Avenue
GENEVA: 28 Rue du Cendrier
SYDNEY: 46 Pitt Street

The CHRISTIAN SCIENCE MONITOR
An International Daily Newspaper

New

K-20-5
ELECTRO-MAGNETIC
VALVE

THE UNSURPASSED
REFRIGERANT VALVE

For Freon Methyl Chloride
Sulphur Dioxide
also Air, Water, Gas, Light Oils, etc.

PROVIDES on and off control of liquid or suction lines. Used with standard thermostats for positive control of refrigerants in either defrosting or reverse cycle systems, multiple temperature processes or with by-pass or unloading valves. Bodies are die forged and all internal parts are bronze or stainless steel.

FOR AUTOMATIC CONTROLS specify General Controls. Request new Catalog 52C, Automatic Pressure, Temperature and Flow Controls.

GENERAL CONTROLS
801 ALLEN AVENUE GLENDALE 1, CALIF.
Manufacturers of Automatic Pressure, Temperature & Flow Controls
FACTORY BRANCHES: PHILADELPHIA • ATLANTA • BOSTON • CHICAGO • DALLAS
KANSAS CITY • NEW YORK • DENVER • DETROIT • CLEVELAND • PITTSBURGH
HOUSTON • SEATTLE • SAN FRANCISCO • DISTRIBUTORS IN PRINCIPAL CITIES

25.3

SKIN IRRITATIONS?

Let Us Help You!

If skin irritations are a problem in your plant let us send you a trial quantity of Tarbonis. In literally hundreds of plants Tarbonis has proved a real help not only in overcoming skin irritations that have occurred, but also in guarding against their recurrence. Pleasant to use—easy to apply—sure of workers' cooperation. Does not interfere with the work to be done. Use the coupon . . . now.

Send for a sample of Tarbonis NOW.

Are These the Irritants?

Cutting Oils
Chrome Dyes
Formaldehyde
Sodium Bichromates
Lime
Metal Dust
Chemicals
Urea and Phenol
Plastic Compounds
Brine
Acid-Type Foods
Foodstuffs
Chemicals
Reagents
Naphtha
Soaps
Detergents

THE TARBONIS COMPANY
4300 Euclid Avenue • Dept. FI • Cleveland 3, Ohio

Please send TARBONIS sample and literature to:

Company.....

Address.....

By.....*Dept.*.....

of milk and milk products consumed through improvements in quality of existing products and the development of products with maximum consumer appeal.

The recognized nutritional values of dairy products will not, in and of themselves, insure their acceptance. Technology must be recognized and employed. Nothing other than applied science will prove adequate for the solution of problems confronting the dairy industry.

—End—

Packaging Oysters

(*Continued from page* 102)

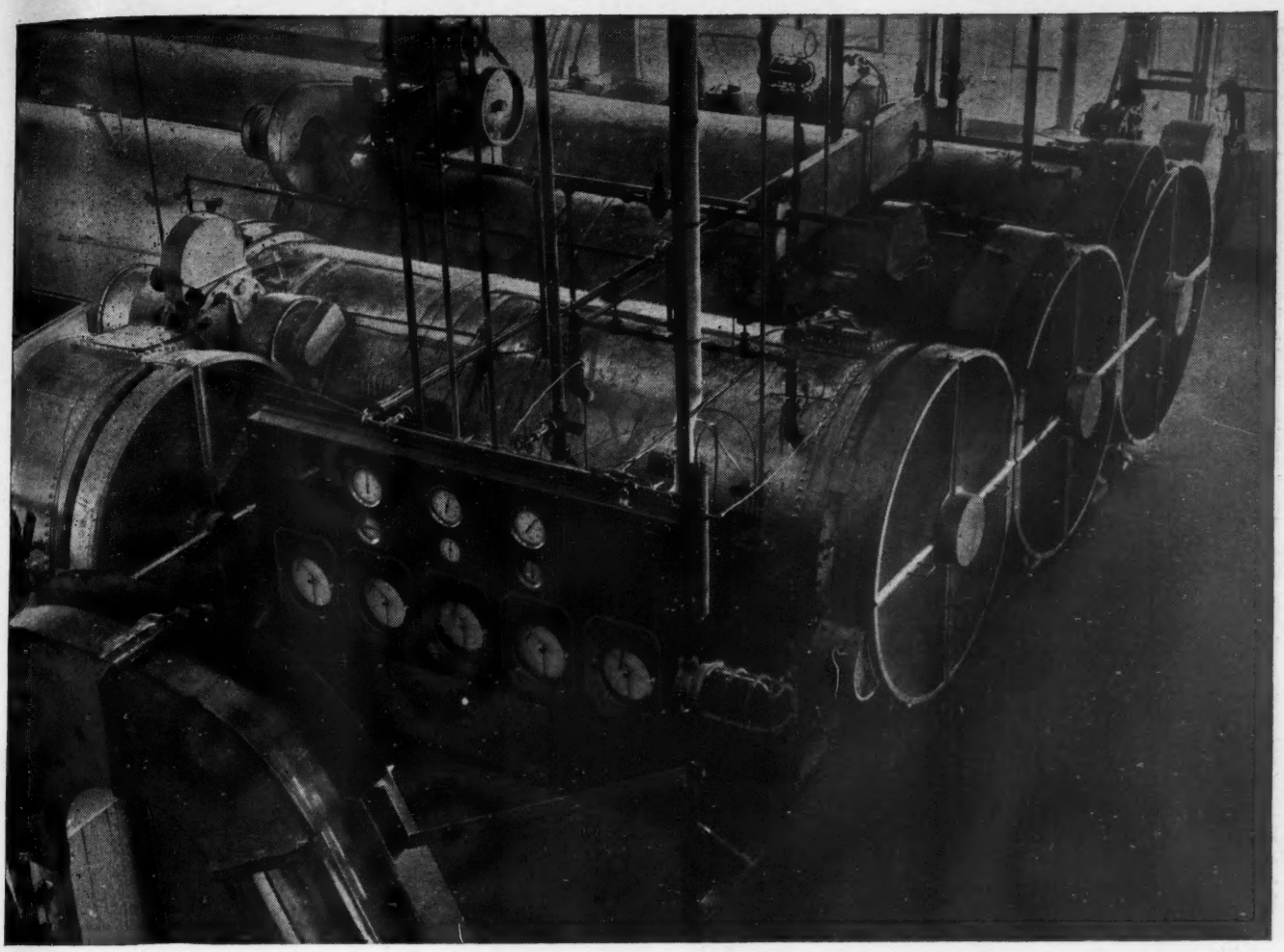
ferences were found in free liquor content of oysters packaged in various types of containers.

Hydrogen Ion Concentration

In past work with shucked oysters, the change in pH of the liquor has proven to be a useful index in following the changes in the degree of freshness of the oysters. Freshly shucked eastern oysters generally have a pH value slightly below 7, which decreases as freshness decreases. When the pH reaches 5.8, the oysters generally become stale. The initial pH value may vary considerably, depending upon the location of the oyster bed, the season of the year, and other factors.

In these tests, the pH of the free liquor was determined with a glass electrode. All oysters used in these tests came from the same source, and had an initial pH value of 6.85 prior to freezing. After one month's storage, the average pH of the oysters in all packages decreased sharply to 6.23. From the first to the fifth month, the pH continued to drop to 6.10. After five months a gradual increase took place until, at the end of 12 months, the pH was the same as the figure for the sample held in storage one month. These tests revealed no significant differences between the oysters frozen and stored in any of the packages used, nor did they reveal any serious deterioration, as measured by pH, during the 12 months' storage period.

The degree of protection of wrappings and packages against dehydration of a frozen product is of primary importance. Free liquor determinations and pH values aid in estimating the changes that occur during freezer storage. The appearance, texture and flavor of the frozen product immediately after freezing and over a period of storage, however, are the important



Taylor makes MOLE HILL out of MOUNTAIN

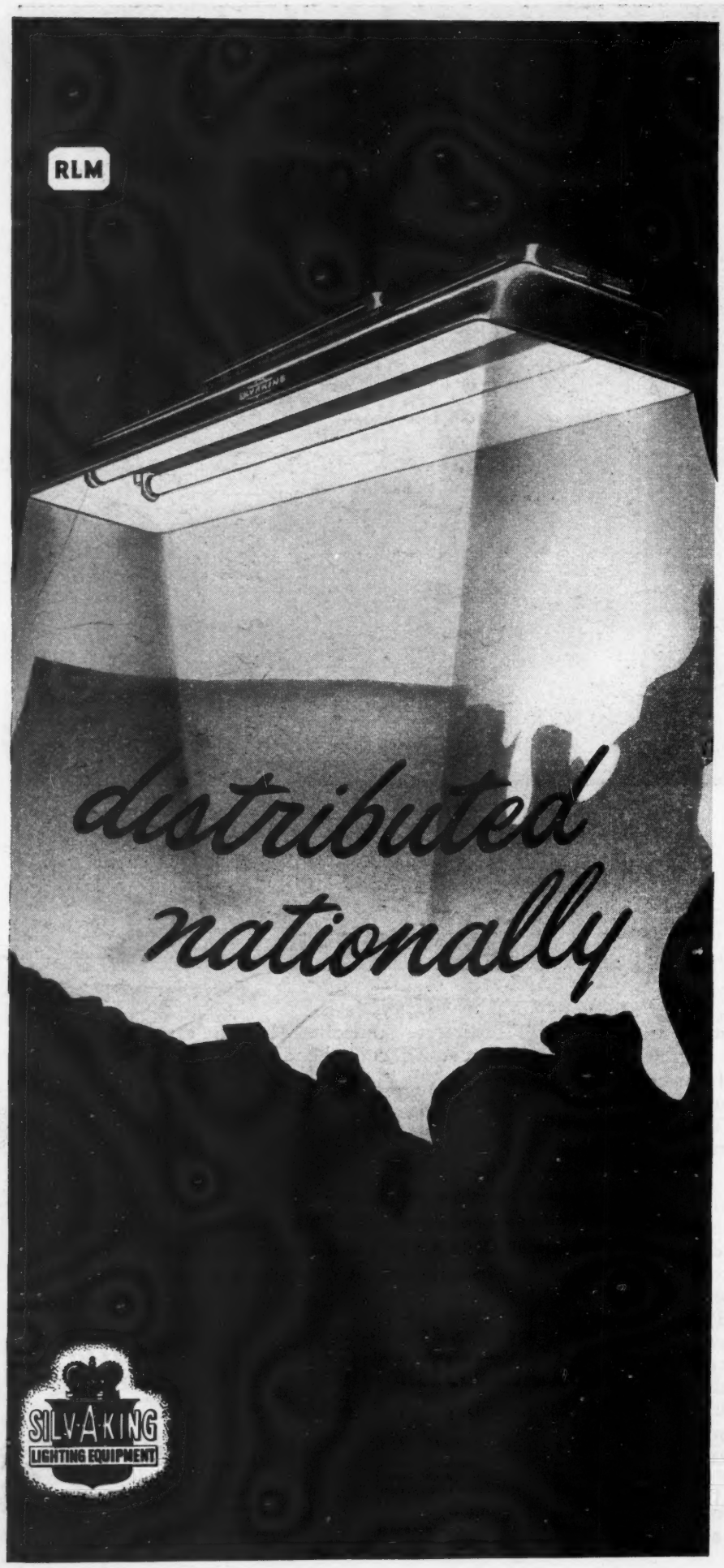
ANYBODY can make a mountain out of a mole hill. But when you can take one of the world's largest continuous cooker-coolers and control it as completely and precisely as a conventional retort, you're really making a *mole hill* out of a *mountain.* That's why we're proud of this Taylor-controlled system at Dennison's Foods Plant in Oakland, California.

The system consists of two A—B continuous cookers in series followed by a pressure cooler and an open cooler. The cans enter the first cooker (upper right background), run by a Taylor Fulscope Recording Temperature Controller. At the far end, out of the picture, they transfer to the second Fulscope-controlled cooker, middle one of the three in line. Then up to the front and into the pressure cooler, which is just back of the panel (you can see the transfer valve on top between the two). One Fulscope controls steam at the inlet and another controls cooling water flow at the outlet. There's also a Pressure Controller which regulates make-up air.

The last step is the open cooler (end of which shows at left of control panel) controlled by another Fulscope Temperature Controller. Here the cans come out perfectly cooked, cooled and ready for labeling.

Maybe your processing problems aren't as complex as this. But if you want more uniform quality, if you want to beat rising costs with new efficiency, we can show you the control system you need. So when you order new equipment, specify "Taylor-equipped!" Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY



factors influencing consumer acceptance. Some products cannot be frozen. Immediate adverse changes occur which affect texture, color and flavor. Other products can be frozen satisfactorily, but change rapidly during storage, becoming unpalatable after a few months. Still other frozen products will undergo a relatively slow change, and remain quite acceptable over a period of a year or more.

Into which of the foregoing categories a frozen product will fall, is of vital concern to the processor and to all those who will handle the product until the ultimate consumer is reached. If the product deteriorates rapidly in cold storage, inventories must be regulated accordingly and rapid turnovers must be depended upon to avoid losses. If relatively slow changes occur during storage, a large frozen pack may be prepared while the fresh product is available, or during periods when production of the fresh product exceeds the demand. The extent of changes in quality and the speed with which they occur should be thoroughly ascertained before any frozen food is offered on the market. Since important changes involve flavor, texture and appearance, organoleptic examinations are relied upon for judging quality.

What Makes a Mailing Click?

Advertising men agree . . . the list is more than half the story. McGraw-Hill Mailing Lists, used by leading manufacturers and industrial service organizations, direct your advertising and sales promotional efforts to key purchasing power.

In view of present day difficulties in maintaining your own mailing lists, this efficient personalized service is particularly important in securing the comprehensive market coverage you need and want. Investigate today.

McGraw-Hill Publishing Co., Inc.
DIRECT MAIL DIVISION
330 West 42nd Street, New York, 18, N. Y.